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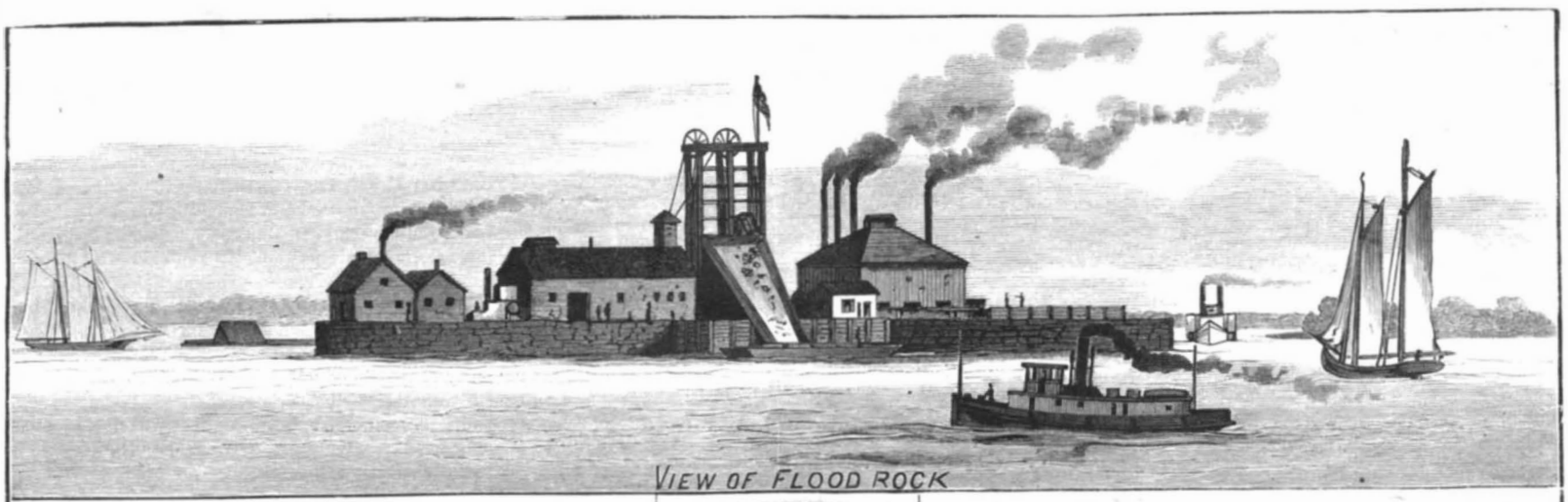

THE REMOVAL OF FLOOD ROCK, NEW YORK, BY TUNNELING.

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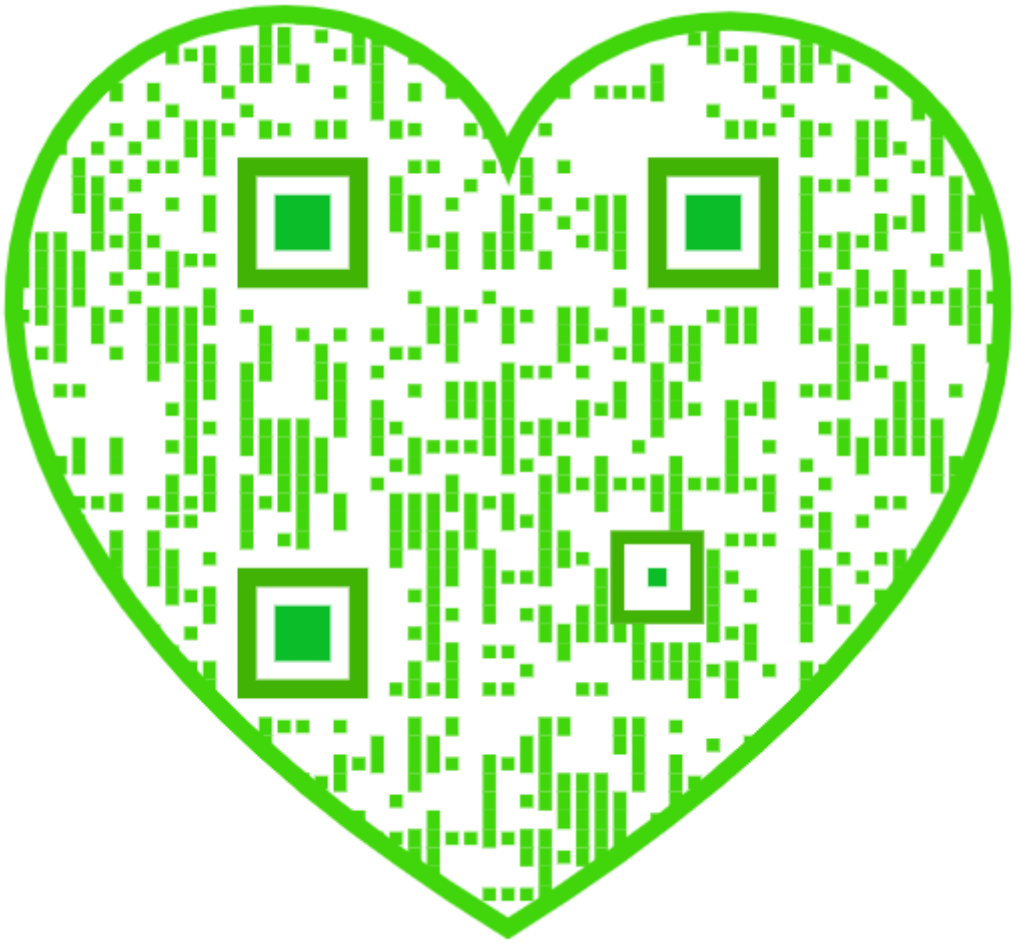

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STORAGE OF HEAT.

Among the many curious phenomena connected with crystallizable metallic salts, especially those of the alkaline bodies, one of the most interesting is the great influence exercised upon temperature during the solution of such crystals.

It is known that when, for example, a glassful of crushed sulphate of soda (Glauber's salts) is sprinkled with muriatic acid, it becomes liquid, and its solution is accompanied by a degree of cold so intense as to cause any water placed therein, in a second vessel, to freeze; and almost every schoolboy is aware that when common salt is allowed to become dissolved with a quantity of snow or crushed ice the temperature is reduced many degrees below the freezing point. Without going into the subject of the conservation or even the correlation of force, which underlies all actions of this nature, it may be stated that by reversing the experiments just cited *heat* is produced. Take a thin glass bottle, fill it nearly full of hot water, and dissolve in it sulphate of soda to saturation; then, while nearly boiling, cork it tightly and allow it to get quite cold. It will be seen that no crystallization takes place, although the water is supersaturated. Now remove the cork, and speedily the whole becomes a solid mass. What we desire here to be noted is that the act of solidification is accompanied by heat, a fact palpable to any one grasping the bottle.

The presence in water of solid bodies, no matter in how fine a state of division, does not alter its boiling point; but no sooner is a crystallizable salt dissolved in water than the boiling point is at once raised, and different salts raise it to different degrees. By direct experiment Professor Tomlinson ascertained that by making saturated solutions of the following salts the boiling point was raised from 212° Fah. to that degree placed opposite to each:

Acetate of soda	256 degrees.
Nitrate of soda	246 "
Nitrate of potash	238 "
Sal ammoniac	236 "
Common salt	224 "
Sulphate of magnesia	222 "
Alum	220 "
Chlorate of potash	218 "
Sulphate of copper	216 "
Sulphate of iron	216 "
Acetate of lead	215 "
Sulphate of soda	213 "

An examination of this table shows that there is one salt which far excels all others in its property of raising the boiling point, namely, acetate of soda.

Quite recently an invention of an interesting nature has been made in which this salt is the chief factor; an invention which, divested of scientific language, may be stated to consist of the property of the acetate to absorb heat when subjected to it for some time and then to give it out afterward over a prolonged period—in effect to store up heat, which, owing to crystalline changes in the salt itself during the act of cooling, is continued to be evolved from the latent into an active form. That this is the case is indicated by the fact that the vessel containing the salt, after having been two hours removed from the source of heat, has its temperature raised about 6 degrees Fah. during the third hour by its own inner forces alone.

The physical principle upon which this curious invention is based is old and well known, although the application of the principle is novel. The form in which we have obtained a specimen "heater" consists of a somewhat large flask formed of thin sheet brass having its mouth soldered up, for it is never intended to be opened. There is also a metallic loop by which to suspend it in the vessel of boiling water from which it is to derive its store of heat. The length of time required for immersion in the hot water depends upon the size of the heater; for example, if it be so small as to be suitable for being carried in a lady's muff, by which to keep her hands warm, four or five minutes will suffice; but if, on the other hand, the dimensions be such as enact the part of a foot warmer, this time would have to be increased by six or eight times. There are some so large as to require immersion in boiling water for an hour before they are fully charged with all the heat they are capable of storing.

While the length of time over which heat is given out depends entirely upon the dimensions of the flask containing the acetate of soda, it may be roughly estimated as about four times as long as hot water will retain its heat. A foot warmer which upon removal from a vessel of hot water was found to register 153° Fah., at the end of eleven hours registered 111°. The most sudden fall took place during the first two hours, after which the temperature rose a few degrees, gradually subsiding afterward until it became quite cold. In the case just adduced the foot warmer fell from 153° to 126° in two hours; it then rose during the next hour to 131°, taking eight hours to fall from 131° to 111°, which it did with uniform regularity.

There are various purposes to which M. Ancelin, of France, the inventor of this new application of acetate of soda, intends to apply it. One or two have been hinted at in course of these remarks; others, such as keeping food or dishes warm at a distance from a fire, will suggest themselves.

THE Upper Ohio River steamer Telegraph lately left Huntington, W. Va., with twenty car loads of freight on board, drawing 3½ feet of water. The Telegraph is one of the finest and fastest passenger steamers on the river. Her length is 290 feet.

OPENING OF GREAT INDUSTRIAL EXHIBITIONS, BOSTON.

Boston has for many years had an annual Industrial Exhibition of some importance, under the auspices of the "Massachusetts Charitable Mechanic Association." This year it will have two of these "grand fairs," one having been inaugurated Aug. 18, and the other promising to open its doors Sept. 13.

The one first in progress is under the auspices of the "Manufacturers' and Mechanics' Institute," which is in some sense an offshoot or rival of the older organization, though only in a friendly way, and the result is that Eastern industries and progress will be represented in these fairs more completely than ever before, as the men at the head of each have worked hard to make the best show possible. Two large and beautiful buildings have been erected, both of them with some architectural pretensions, the newer association, however, having the largest, covering five acres of ground, and giving with the galleries nearly ten acres of floor space, and the Exhibition now open is much more imposing than any the country has had since the Centennial.

There are so many specialties of great interest to all inventors, mechanics, and manufacturers, as well as the general public, in any great show of this kind, that it is difficult to pick out for mention only such things as would be novelties to one who had kept fully abreast of the progress of invention and the improvements in machinery. The fair is, however, particularly representative of the cotton and woolen factories and machine shops of New England. The great corporations of Lawrence, Lowell, and Fall River, Mass., Manchester and Nashua, N. H., Providence, R. I., and other places have on exhibition probably the best display of their productions that was ever made. But to properly appreciate the variety and beauty of the fabrics they must be compared with those made at the same mills or imported from abroad only a few years ago, when the greatly enlarged capabilities and improved workmanship of the factories to-day stand out in high relief.

In the machinery for the manufacture of these goods the exhibition presents a comparatively small assortment, although covering some important and recent improvements in looms, carders, and mules. The deficiency in this department is due to the fact that many who would otherwise exhibit here are to be fully represented at Atlanta, but it will be somewhat amended in a few days by the tardy ones who are late in putting up some novelties in cotton and woolen spinning.

In the boot and shoe manufacture the Exhibition leaves nothing to be desired. This is by far the leading feature of the show and attracts crowds of visitors, for never before was this industry, in all its departments, so completely arranged to give the public ample opportunity for an examination into the way in which boots and shoes are made. By a happy conceit also, an aged shoemaker, working by hand after the old style and sitting on a shoemaker's bench which had been used by two workmen for a hundred years, occupies a prominent position, as he laboriously "pegs away in the midst of these modern surroundings." About 100 men work here, the machinery running from 9 A.M. till 9 P.M., and the production being about 600 pairs a day.

The leather comes to the Exhibition building direct from the tanneries and currying shops, the sole leather in sides and bundles, and the upper in rolls. The latter is all cut out by hand after patterns, as the workman has to examine the leather carefully to see that particularly strong and good parts come on the vamp or forepart of the boot or shoe. The soles, insoles, and taps are died out by machines which, to an outsider, look far larger than they need be, but this is so that a whole side may come under a cutter's eye at once, and he can place his die so as to save stock, cutting first the thickest parts into outsoles, and the remainder into taps, insoles, and heels.

The uppers, after cutting, are wet, and then passed through a powerful machine which crimps and forms them, drawing the leather out so that it can be lasted easily into proper shape. There are four of these machines. The fronts and backs of the uppers are then sewed together by a machine, which, after a long process of development, has been made about perfect for this kind of work; after which, with the inner sole, it is taken to a lasting machine, and these two parts made temporarily firm over the last. This last part of the work is something for which inventors have long been trying to perfect machinery, but nothing so far brought out has yet been generally adopted, and the machine here in use for this purpose leaves much to be desired.

After the boot or shoe has been lasted there are four different ways shown here of putting on the sole—screwing on with brass screw wire, pegging, sewing direct through from inside to outside, and sewing on with a welt in imitation of handwork. The brass screwing makes the firmest fastening for heavy work, while it does not make the sole unduly stiff and hard; the wire is actually screwed in, so that it does not break and tear the leather. The pegging machine has long been a familiar object at exhibitions, but it is always interesting to the public. The putting on of the bottom with a welt requires two machines, one of which works with a curved needle in a section of a circle, the inner sole, upper, and welt being first sewed, and then the outsole to the welt. This machinery has been improved through several years, until the goods made by it are now meeting with considerable public favor, for they meet that demand for flexibility with firmness of sole which many people think are only surely obtained with handwork.

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For the trimming, blacking and staining, buffing, and burnishing of the soles and heels, a number of very ingenious machines are kept at work; but an entirely new thing in the finishing process is a treeing machine, here shown for the first time. It is so arranged that a dozen boots can be operated on at a time and moderately heated by steam while on the trees, so that the stuffing is warmed through with the leather, and the boot can be made to look, as one manufacturer said, "a dollar a case better."

Of the arrangement of goods and machinery, alike for convenience of access, facility in operating, and effectiveness of appearance, as well as the general management of the Exhibition, it may be said that too much praise cannot be awarded the officers and the executive committee. They are public-spirited men, manufacturers and merchants who have inaugurated the enterprise for the pride they have in Boston and in New England manufactures, and in such a spirit they are carrying it on.

PROMOTIONS IN THE PATENT OFFICE.

The following changes were made in the staff of the Patent Office, July 1, 1881:

Marcellus Gardner, of New York; John W. Babson, of Maine; and Schuyler Duryee: from fourth class clerkships to be chiefs of division—salary $2,000.

Samuel B. Roane, of New York; Reuben S. Parks, of Ohio; and Louis W. Sinsabaugh, of Ohio: from second assistant examiner, to be first assistant examiner—salary $1,800.

David G. Purman, of Wisconsin; Marshall B. Cushman, of Massachusetts; Edward M. Bentley, of Connecticut; and Albert C. Fowler, of District of Columbia: from third assistant examiner to be second assistant examiner—salary $1,600.

William L. Augenbaugh, of Ohio, from first class clerk to be second assistant examiner—salary $1,600.

The following have been promoted or newly appointed to the office of third assistant examiner—salary $1,400: John W. Clements, District Columbia, from second class clerk; James B. Littlewood, of Illinois, from first class clerk; Rufus A. Morrison, of Pennsylvania, from copyist; Robert G. Read of Pennsylvania, and Walter F. Rogers, of Pennsylvania, new appointments. George R. Byington, of Cincinnati, promoted from first to second class clerk—salary $1,400.

The following have been promoted to first class clerkships—salary $1,200: William Hendlay, District Columbia; Frederick W. Crocker, New York; St. Clair F. Sutherland, Mississippi; Frank P. McLean, New Hampshire; Thomas Hoge, Pennsylvania; Mrs. Frank R. Lybrand, Ohio; Daniel Clarke, Maryland.

Frederick R. Gantt, from draughtsman, at $1,000, to skilled draughtsman—salary $1,200.

The following rise from copyist, at $900, to first class—salary $1,200: Henry E. Baker, of Mississippi; Julian C. Dowell, North Carolina; Milnor R. Sullivan, Ohio; Frank M. Ward, District Columbia; Thompson J. Hudson, Ohio; George H. Evans, District Columbia. To a salary of $1,000, the following: Gormond Crandall, New York; William B. Atkinson, District Columbia; William A. Redmond, District Columbia; James M. Pollard, Louisiana; Thomas H. Mitchell, Tennessee; Archibald McNaught, Wisconsin; Mrs. Mabel Hatch, New Hampshire; William H. Chapman, Ohio; Thomas R. Stuart, California, to draughtsman.

REVIVING OLD REJECTED CASES.

Under the former practice of the Patent Office cases occurred in which widely established industries, worked for years free of any patent, were suddenly injured and crushed by the unexpected reissue and grant of some aged, long slumbering, rejected case.

It would appear from a recent decision by the present Commissioner of Patents, Mr. Marble, that he is not one of those who favor such revivals.

In a recent appeal to the Commissioner of Patents, in the case of F. W. Smith, applicant for a patent for a sweat leather, it appeared that the application was originally filed and rejected in 1871. In 1879, nearly eight years having elapsed, the inventor files a new application, intending thereby to revive the old case.

The Commissioner says:

"The law applicable to this case is section 32 of the act of 1870 (Rev. Stats., sec. 4,894), which reads as follows:

"'All applications for patents shall be completed and prepared for examination within two years after the filing of the application, and in default thereof or upon failure of the applicant to prosecute the same within two years after any action therein, of which notice shall have been given to the applicant, they shall be regarded as abandoned by the parties thereto, unless it be shown to the satisfaction of the Commissioner of Patents that such delay was unavoidable.'

"The authorities cited in behalf of Smith (*Colgate vs. Western Union, Smith vs. Dental Vulcanite Company*, and others) to show that this diligence has been reasonable, and that he has not abandoned the invention, were cases under the law of 1836, and are therefore inapplicable to the present case. Under that law an application might be renewed after a lapse of any period of time unless it appear that the invention had been in the meantime abandoned (*Bell vs. Daniel*, 1 Bond, 212), and that, too, though the first application had been withdrawn. (*Godfrey vs. Eames*, 1 Wall., 317.)

"The present law was devised to overcome the many evils which had sprung up under this practice, and provided that all applications filed and rejected previous to the passage of the law would be presumed to be abandoned by the parties at the expiration of six months from the date of the passage of the act, unless in the meantime they should be renewed (section 35, second proviso), and that for the future all applications for patents not prosecuted within two years after any action therein shall be presumed to be abandoned by the parties, unless it shall be shown to the satisfaction of the Commissioner of Patents that the delay was unavoidable. I am not aware that this section of the law has as yet received judicial attention, but I find no difficulty in discovering the application of the law to the facts of this case. It is clear that only an extraordinary combination of circumstances could unavoidably prevent an inventor from taking some step in connection with his application for a period of nearly eight years.

"Attaching full credit to the statements of the affiants that Smith was continuously in straightened circumstances, and that he expressed at various times his desire to obtain a patent for his invention, I do not find that at any time he made any serious efforts to abtain assistance in prosecuting his application, or that it is clear, as a matter of fact, that it was his constant intention to renew the application or procure a patent for his invention.

"I must hold that Smith's application, filed in 1871, was abandoned by operation of section 4,894 of the Revised Statutes, and that he must stand upon his present date of filing.

STEAM-BOILER NOTES.

The percentage of active steam boilers that violently explode with fatal effect is not at any time very large; statistics show that there is but about one in two thousand annually of those in use in England, equal to one per cent in twenty years. The number of cases, therefore, that may be actually observed by any one person in a lifetime that is devoted to the common business of life is very small, so, there being not more than one person in a thousand of those who do observe these accidents who is capable of forming a reasonable opinion as to the cause, and not more than one in a hundred thousand who, being capable, does actually see and study more than his quota of cases, it is not strange that there are differences of opinion that result in bickering and recrimination among those who are accustomed to have their opinions respected and who have set up in the business of teaching a branch of engineering that they themselves have not practically studied.

The number of persons who attempt to make a thorough study of boiler explosions that have the opportunity to see one in the act is still smaller, and perhaps not a single one qualified by previous experience and by scientific attainments to be a good judge, and devoting sufficient time to the subject, has even favored the public with his views.

It seems to be a defect in the means of getting information that the informants are not reliable, being frightened out of their wits by the explosion or interested in making out that they had done their duty faithfully in the management before it occurred, and their testimony is, therefore, of the most unreliable sort, although they appear while giving it before juries to be respectable and reliable witnesses. Many times, perhaps most often, a careful examination of the remains of the boiler and its attachments would show that some of them are mistaken; that without a reversal of the laws of nature their statements could not be true; but being accepted, the whole thing becomes an inexplicable mystery. Some theory must be applied to the case by the wiseacres who should have carefully examined every detail of the wreck and eliminated all impossible and contradictory elements before giving their opinions as experts, weighing carefully all the possibilities and discarding all alleged phenomena that are in contravention of natural laws and depend on human acts, perceptions, or emotions.

DR. HEATH'S DISCOVERIES IN SOUTH AMERICA.

In the SCIENTIFIC AMERICAN of June 18, 1881, an account was given of the successful journey of Dr. E. R. Heath down the previously unexplored portion of the Beni River, Bolivia, and his discovery of abundant rubber and cinchona forests there. The Kansas City *Review* for September contains further particulars of the expedition, compiled from Dr. Heath's letters to his brother in that city, with a sketch map of the part of the river now for the first time opened up to geography and commerce.

Dr. Heath writes that the news of his successful passage through the country of the cannibals spread like wildfire. New rubber forests are to the people of that region what new gold fields are to the inhabitants of North America, and immediately something like a stampede occurred. Everybody talked "Beni," and 10,000 men had gone down to the new rubber region. Last year the export of rubber from the Beni was 15,000 pounds; this year it will be 750,000 pounds; and next year it will probably rise to 6,250,000.

Dr. Heath has proved himself to be not only an enthusiastic but an exceedingly plucky and capable explorer. He writes that he intends to return home this fall to organize an expedition for exploring the Madre de Dios, a river much larger and longer than the Beni, and quite as little known. His plan is to begin his survey at the ancient Inca capital of Cuzco, in Peru, and descend the Madre de Dios from its smallest beginnings, spending at least two years in the work. Besides the work of exploration he hopes to discover rich deposits of the precious metals, new forests of cinchona trees, valuable textile and medicinal plants, rubber forests, and other contributions to commerce and science.

The Exhibition of Electric Light at Paris.

To the Editor of the Scientific American:

The first public exhibition of electric light, which took place on the evening of Saturday, Aug. 27th, was, in many respects, a failure, but few of the systems being in good order, and many of them unable to be exhibited at all. Notwithstanding this fact, those who were present were forced to admire the brilliant display of the new and wonderful progress of electric lighting, and to speculate upon its future career.

It is thought by some, it is true, that the gas companies will be encouraged rather than otherwise by the exhibition of electric light, and will have confidence in their security for some time to come; but whether electricity is to take the place of gas or not, depends in a great measure upon the final decision of the general opinion of the public. At the present moment I am inclined to be of the same opinion as the gas companies themselves. Those portions of the exhibition of lights which are worth mentioning, are first, and above all, the Siemens and Halske lamps. It is only fair to say that there was nothing in the whole exhibition to compare in brilliancy and effect with the luster of the two great lamps of this firm. The Jablochkoff lamps which we have heretofore so much admired were quite thrown in the shade and actually had a mean appearance before these exquisite burners.

Next in order to the Siemens and Halske lights must be mentioned those of Brush. This was a truly fine display, and attracted general admiration and wonder, not only on account of the great number and perfect working order of the lamps, but also because that the system is said to be by far the least expensive, and, therefore, the most practical on exhibition. Next in order may be mentioned the Jaspar lamps, with immense reflectors. These lamps gave a very agreeable, steady light, and for some purposes may be considered very practical. Before going further, I must speak of a new system which gave great satisfaction and was much admired by the visitors, viz., that of the Austrian engineer, Gulcher.

This exhibition consisted of eight fine lamps, which gave a steady, soft, mellowy light of a yellow color and of great strength.

The light of the Siemens and Halske firm, as also that of Brush and of Jaspar, is more white in color.

The exposition of the Swan and Edison and Maxim lamps of incandescence afforded a particular surprise and pleasure to those who had not heretofore witnessed them. They gave an impression of elegance and taste which recalled vividly to mind the candle chandeliers of our ancestors, which still retain the post of honor in many European mansions. But of the practicability of these systems we are not yet informed.

To the unprejudiced eye of the general spectator there were no other systems on exhibition which were worthy of note. However, as we have said, many of the lamps of other systems were not yet in order, and there may be occasion for a different opinion in future, in case some of these unfinished systems should excel those we have named.

The French department was a cause of regret and wonder as far as regards their exhibition of lights, that department being quite thrown in shadow by the more successful and brilliant foreign departments.

The light-house, which was intended as a great addition to the general display, proved in fact to be a perfect nuisance, its colored, revolving lights casting a ghastly and ominous shade over the different systems of lamps in the gallery and prohibiting the spectator from forming any just estimate of their value.

Some of those systems which were ill worked made a most ludicrous display, puffing and winking, now darting fire, now presenting a mere dull coal to the looker on, sometimes even going entirely out.

Finally, whatever else may be said in favor of electric light, there remains one serious and insurmountable objection to it, which will place one half the human race in direct opposition to its adoption, and that is, that it lays bare all the secrets and defects of the complexion, nay, even adds hideousness to it, whereas the mellow gaslight added many a charm and smoothed many a wrinkle.

Whether our scientists and speculators in the scientific mines will take this last-mentioned fact into consideration remains to be seen. One thing is sure, the pleasure felt in gazing upon the electric lights is much destroyed by the disagreeable feeling experienced in looking upon each other, though it must not be forgotten that the incandescent lamps are an exception in this respect, and, therefore, if practical in other respects, will no doubt take the palm for all indoor use.

GUSTAVE GLASER.

Look Out for the Pilgrim.

A mysterious star, called the Pilgrim, which was observed in 945, 1264, and 1572, is expected by astronomers to appear before long. It was described in 1572 as brighter than Jupiter, and "such was its brilliancy that persons were able to detect it at noon in a clear sky, and at night when the sky was so overcast as to hide all other stars." If it appears it will probably be visible for several weeks in the constellation of Cassiopeia.

DEEP SHAFT IN VICTORIA.—The Melbourne *Age* states that the Magdala shaft, Stowell, has a total depth from the surface of 2,930 feet, or 1,566 feet below sea level. This is the deepest shaft in Victoria.

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INSTANTANEOUS PHOTOGRAPHY.

We are indebted to Gen. Henry L. Abbot, U.S.A., in charge of the Engineer School of Application, Willet's Point, N. Y., for copies of photographs illustrating the remarkable sensitiveness of photo-gelatine plates, which we will briefly describe. It became necessary, one day, at Willet's point to destroy a worthless mule, and the subject was made the occasion of giving useful instruction to the military class there stationed. The mule was placed in proper position before a photo camera and duly focused. Upon the animal's forehead a cotton bag was tied containing six ounces of dynamite. The slide of the camera was supported by a fuse; the camera fuse and the dynamite on the mule's head being connected in the same electrical circuit, as shown by the wires in our engraving. On pressing the key so as to send the electricity through the wires, both the fuse and the dynamite were simultaneously fired; the camera slide and the head of the animal fell nearly together. The photo-sensitive plate was impressed with a picture of the headless creature, still standing, before its body had time to fall.

Fig. 1 of our illustrations shows the animal, camera and electrical wires in position for firing. Fig. 2 shows the appearance of the animal after the explosion, as taken on the photo plate. The experiment was made June 6 last.

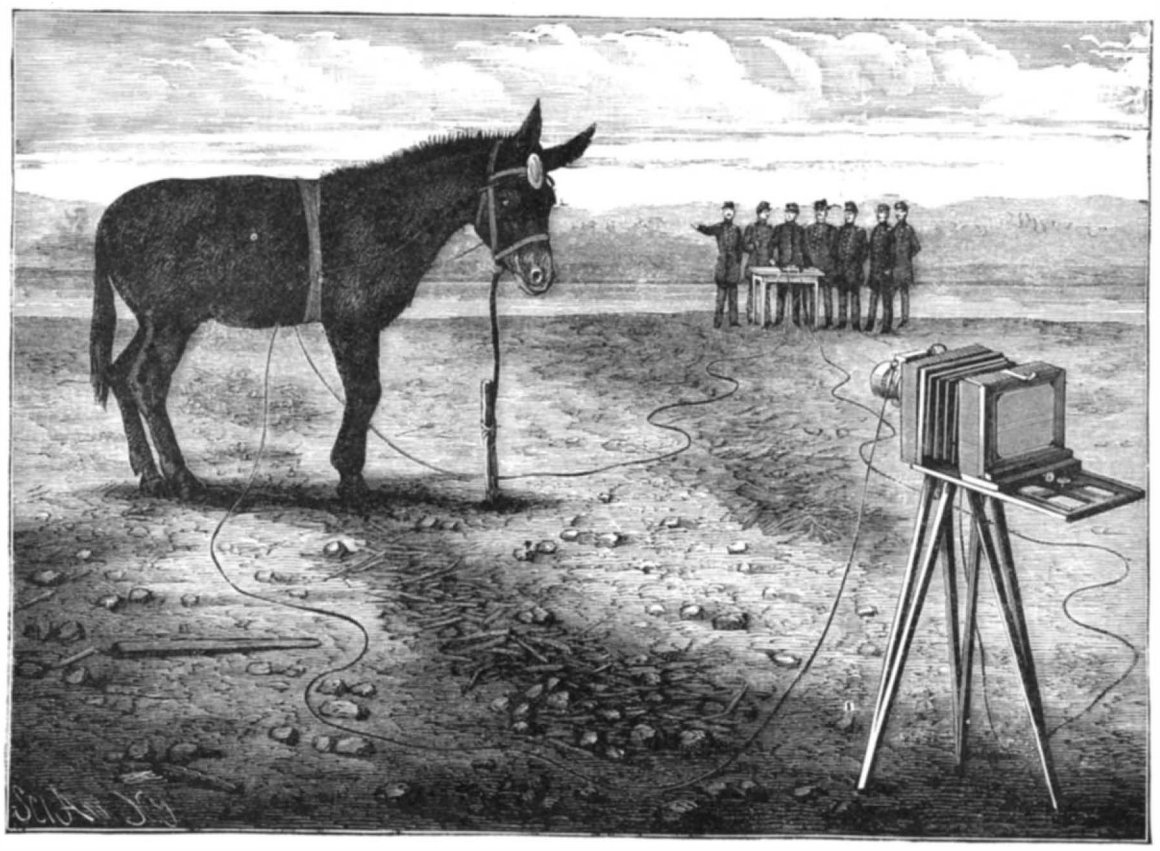

Fig. 1.—INSTANTANEOUS PHOTOGRAPHY.—BEFORE THE EXPLOSION.

The Bahama Banks.

The new data lately obtained by the United States coast and geodetic steamer Blake, Commander J. R. Bartlett, U.S.N., arrived at Providence, R. I., August 17, shows that the Bahama banks extend in an almost level plateau, nearly 200 miles wide, off the Carolinas, and drawing to a point at Cape Hatteras, only twenty-five miles off shore there being nearly two thousand fathoms. The average depth on the plateau was found to be a little over four hundred fathoms.

A Costly Dog Collar.

A San Francisco jeweler has lately made for a noted trick dog a collar described as follows:

The collar is made in twenty-four sections, comprising quartz, petrified wood, and silver silicates, such as never have been worked before, representing in their natural form perfect Japanese characters. Six of the sections are made in cabinet work representing fifty-seven different mines, with all the colors of quartz—black, pink, white, and greenish casts of every kind. At each end of the collar the section is of carbonate of silver with malachite streaks; then in regular order silver quartz; cabinets with minerals from different mines; then petrified wood and gold quartz until the center is reached, which is a large, oval-shaped cabinet with different ores, and the name of the dog, "Zip," in solid gold letters covered with Japanese crystal. As a specimen of California workmanship this is undoubtedly the finest that has yet been seen, both for beauty of design and excellence of workmanship, every prominent mine on the whole coast from Tombstone, Arizona, to Silver City, Idaho, being represented. The fastening is a lock of solid gold inlaid with platina.

Rapid Town Making.

About the middle of August a stampede took place from Deadwood, Central City, and Lead City, Dakota, to a new and wonderfully promising silver region about ten miles from Deadwood. A town was laid out, lots drawn for by all present, rules of government agreed to, and the place named "West Virginia City." In forty-eight hours the town contained nearly one thousand inhabitants, and nine saloons were in operation. On the third day two faro banks were opened, restaurants were started, and, to cap the climax, on the fourth day the first copy of a daily newspaper, called the *Carbonate Reporter*, was issued. Fifty buildings were erected in one week, and as high as $500 paid for building lots. The town promises to be permanent, as there have been many rich finds.

Kentucky's Biggest Tree Felled.

The Louisville *Commercial* reports the felling of Kentucky's largest tree near Carr's. The tree measured 18 feet in diameter at the base. The cut was made 6 feet above the ground, where the tree was 12 feet through. The *Commercial* adds:

"From the cut to the first limb can be made eight good length rail-cuts, each 10 feet long, which would split enough rails to fence a small farm. The first limb was nearly a half dozen feet in diameter, and it would have, by itself, made a very large saw log. Nearly all the small limbs had fallen and decayed away. Its plank measurement is computed at nearly 50,000 feet, besides several limbs that would make, altogether, 25 cords of wood. On the day of the felling a large concourse of people marched from Vanceburg to the place. Colonel W. S. Rand, an able speaker, was the orator of the day. He and others, qualified to be good judges of such things, supposed that this mighty forester was four or five centuries old. There were to be distinctly seen over 300 rings, and it is not known how long since it completed its growth, as it has been dead for many years.

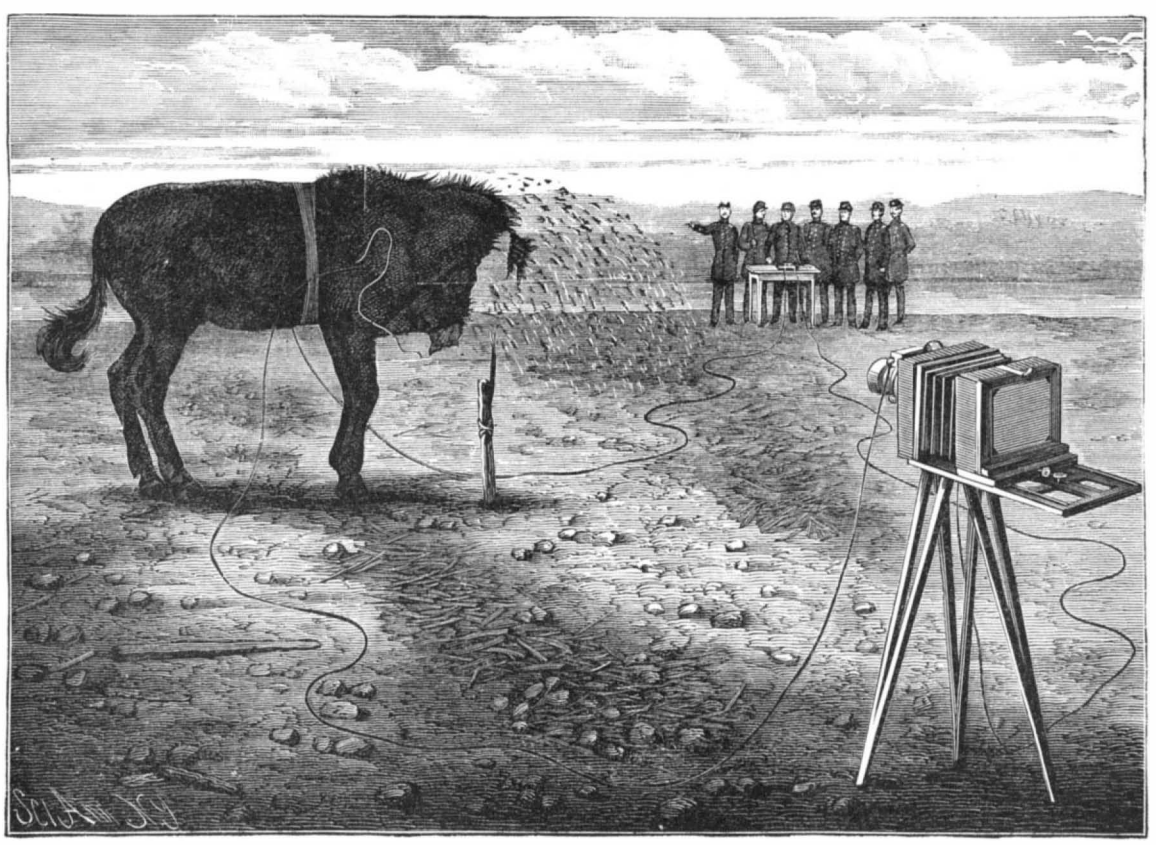

Fig. 2.—INSTANTANEOUS PHOTOGRAPHY.—AFTER THE EXPLOSION.

MECHANICAL INVENTIONS.

An improved elevator and carrier has been patented by Mr. Daniel Dockstader, of Fonda, N. Y. The invention consists of novel devices for holding the carrier in place while loading, for unlocking the carrier so that it may be moved on its track.

An improved petticoat pipe fastener has been patented by Mr. Patrick J. Cleary, of Golden, Col. The object of the invention is to provide a secure, rapid, and convenient method of attaching, supporting, and removing the petticoat pipe in a locomotive smoke stack.

An improved cotton press has been patented by Mr. Theophilus Griffin, of Scotland Neck, N. C. The invention consists in a novel arrangement and combination of ropes and windlasses, whereby great power is obtained.

William Lay, of Atlanta, Ga., has patented a cheap, simple, and economical water motor that can be operated with a small quantity and but slight fall of water. The invention is designed as an improvement on the water motors for which Letters Patent No. 223,930 and No. 227,023 were issued to the same inventor January 27, 1880, and April 27, 1880, respectively.

An improved machine for making shoe buttons has been patented by Mr. Marcus M. Rhodes, of Taunton, Mass. These improvements relate to machines for forming the heads of the buttons from *papier mâché* blanks, cutting off the wire blanks, and forming the eyes and pressing the button heads upon the shanks of the eyes automatically and by successive operations in proper order.

A machine for beating and polishing rice has been patented by Mr. Jacob R. Sample, of Summit, Miss. The object of this invention is to facilitate the removal of the hulls of rice and the cleaning and polishing of the kernels.

Mr. Lewis R. Budd, of Cambridge, Texas, has patented improvements in moulds for constructing earth and stone fences; and it consists of a mould or guide for a solid fence made of sod and earth, or stone and earth, or other material.

An improved hoisting machine, patented by Mr. William B. Padgett, of Batesville, Ark., consists in a novel arrangement, a platform, a hollow screw shaft, a series of windlasses, a rope or chain, and a series of pulleys, whereby provision is made for raising and lowering weights, and for other purposes.

Mr. William W. Hills, of Cadillac, Mich., has patented an improved cant dog. The object of this invention is to improve the construction of cant hooks in such a manner as to make them stronger and more convenient and serviceable.

A machine for attaching tags to plug tobacco has been patented by Mr. August Markert, of Jersey City, N. J. The invention consists in a vertically sliding platform provided with suitablegauges, etc., pressed upward by springs, and provided with a removable longitudinal strip with apertures of the same size and shape as the tags, into which a series of vertical posts of the base of the machine project. The tags are placed upon the upper end surfaces of the posts with the prongs projecting upward, and the strips of paper and pieces of plug tobacco are placed upon the platform, upon which the piece of tobacco, and consequently the platform also, are depressed, and as the posts are rigid the tobacco can only be depressed until it rests on the posts; but by this operation the prongs of the tags have been forced into the tobacco.

An improved sash cord fastener has been patented by Messrs. Thomas P. Dunne and Paul Rath, of New York city. The object of this invention is to facilitate the attaching of the sash cord from which the balancing weight is suspended to the sash in such a manner that neither the stop beads, parting strips, nor the sashes need be removed for attaching the cord or chain.

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ELECTRIC FLYING MACHINE.

The improvements recently made in electric motors have suggested to the eminent French electrician, M. Gaston Tissandier, the idea of employing these machines to propel air balloons. They can be used in connection with M. Planté's secondary couples, which store a large amount of electric energy and weigh relatively little. Such a motor possesses great advantages. There is no danger of firing the volume of hydrogen above, and it has a constant weight, there being no decrease by combustion.

In making his experiments M. Tissandier employed a small oblong balloon ending in conical points. This balloon, which is like that used by M. Giffard, is 3 m. long by 1·30 m. in diameter, and has a volume of about 2 200 liters. Inflated with pure hydrogen it has an ascensional force of 2 kilogrammes.

It is worked by a small electric motor resembling the Siemens dynamo, and weighing 220 grammes. This works a light propeller 40 inches in diameter. This motor is suspended below the balloon, and will propel the balloon for several miles with a Planté element of 220 grammes, while with a secondary couple weighing 1·300 kilogrammes the duration of its rotation is considerably increased. Under these conditions the armature turns 6·5 times a second, and acts as a propeller, giving the balloon a speed of 1 m. a second during more than 40 minutes. With two secondary elements, a propeller 60 inches in diameter can be used, which will propel the balloon at the rate of 2 m. a second during 10 minutes; and with three elements a speed of 3 m. can be obtained.

These experiments took place in the "Conservatoire des Arts et Metiers," at Paris, in a large hall, where the balloon could move freely, restrained only by a light rope dragging behind it, which served at the same time to guide and to measure its speed.

The working power of the electric motor was measured by the simple method of lifting weights. A secondary element, and afterwards two elements together, were attached to the motor, and it was found that the swiftness of the revolutions varied according to the weight lifted.

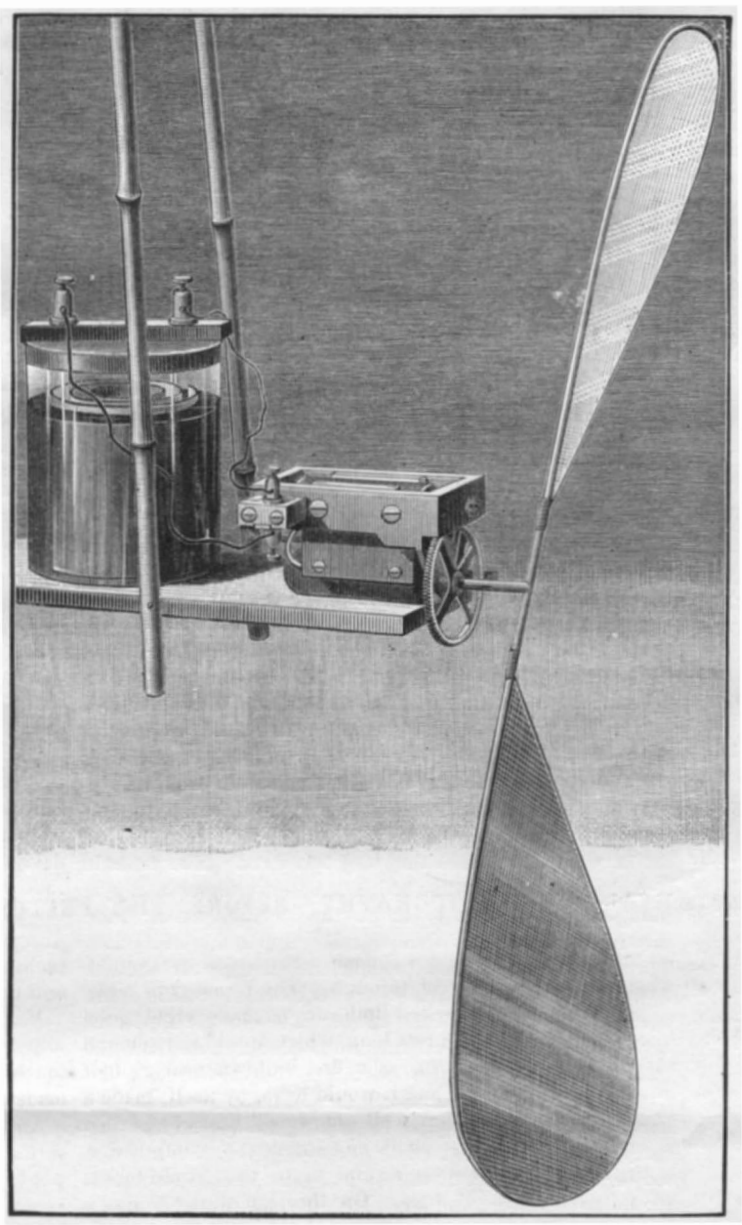
This little motor, when developing a maximum of energy with a single element, produced a force of 90 grammes at a speed of 5 revolutions a second. With two elements a speed of 12 revolutions a second was obtained and a power of 420 grammes. With three elements the power was 1 kilogramme.

In working with two elements, if the speed is reduced to 5 or 6 revolutions a second, the power is also reduced, and, on the other hand, if the speed becomes greater than that which corresponds to the maximum power, the working force is correspondingly reduced. For example, if the speed obtained is 14 or 15 revolutions a second, the power is only 375 grammes. The manner this trial balloon acted, and the speed obtained with the propeller, afford a very satisfactory outlook for aerial navigation, as it must be remembered that in balloons the surface does not increase with the volume, consequently the results obtained with larger balloons would be still more favorable.

In working condition an electric motor equal to 6 horse power and weighing 3·0 kilogrammes, with 900 kilogrammes of secondary elements, would easily carry 1,200 kilogrammes when attached to in a hydrogen balloon of 3,000 cubic meters, elongated in shape like those used in 1852 by M. Giffard, and in 1872 by M. Dupuy de Lôme. This balloon would be 40 m. long by 13·50 m. wide across the center, and its ascensional force would be about 3,300 kilogrammes. It would weigh, with all its accessories, 1,200 kilogrammes; so there would remain for the voyagers and for ballast over 1,000 kilogrammes. In calm weather this balloon, worked by an armature of 5 to 6 m. in diameter, would obtain a speed of 20 kilogrammes an hour, and in windy weather would be powerful enough to move out of the direct line of the air current.*

Of course, this balloon could only go for a limited time, but that could easily be decided by experiments, in which results even more favorable might be obtained by making the motor and piles especially light for this purpose.

Until now no balloon has ever been really steered, that is, has never returned to its point of departure after having navigated the atmosphere at the will of its pilot. Necessarily such voyages can only take place in calm air and during a short time; but the essential point is that they have succeeded at all; and no physicist can deny that the electric motor and the secondary piles have solved the problem of aerial navigation.



PROPELLER OF ELECTRIC FLYING MACHINE.

Southern New Jersey Sinking.

Professor George H. Cook, State Geologist of New Jersey, concludes that the land in Cape May and Cumberland counties is gradually but certainly sinking. From knowledge now in his possession he estimates that the surface has settled about eight feet during the last hundred years. During a recent visit he declared it his intention to test the matter by placing stone posts in the ground at certain localities, a record of which should be kept so as to insure their being found at any future time, said stones to be so set and marked with reference to their height above the sea level that it may be positively ascertained whether this portion of the State is becoming lower, and at what rate.

The Alphabet in Prehistoric America.

At the recent Science Convention, at Cincinnati, Major Wm. S. Beebe, of Brooklyn, read a very suggestive paper on the inscribed records of the Mound Builders, especially those discovered at Piqua, Ohio, and Davenport, Iowa. The former were on tablets of earthenware, the latter inscribed slates. On the Piqua tablets the characters are in horizontal lines, and in four of these lines they were, in each case, six in number. In the fifth and remaining instance there were five, but this arrangement was some distance, in the longitudinal direction of the tablet, from the group first mentioned, which were in both cases written in couples.

One of the Davenport slates was inscribed on one side, the other on both. The stone inscribed on but one side bore on its surface a series of concentric circles. Between the outer two of these were twelve equidistant signs, presumably the zodiacal signs. The slate had two perforations on one of its edges, evidently for suspension.

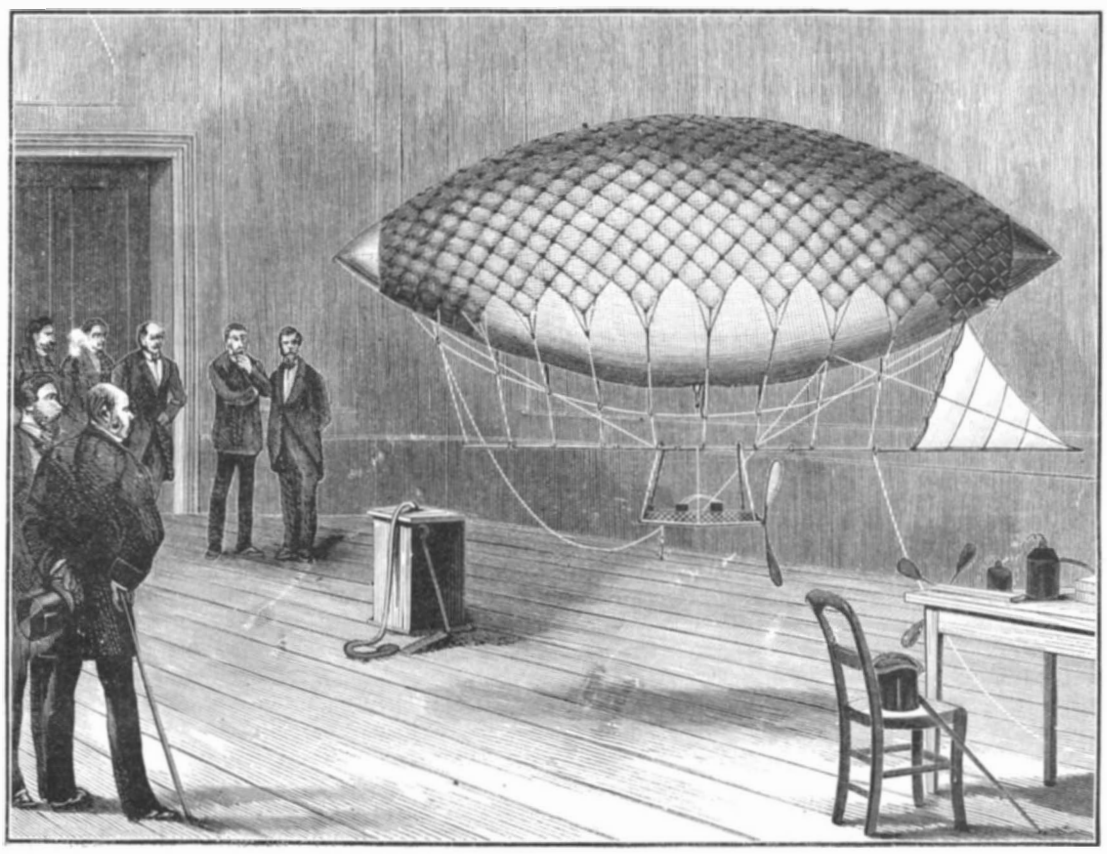
Major Beebe claimed that the Piqua inscriptions are the names of the eight zodiacal signs on the Davenport slate, excepting Capricornus, Aries, Cancer, and Libra, which four signs are represented by four initial letters on the back of one of the Piqua tablets, and which representing the north, west, south, and east respectively, and corresponding to the Tucatec Bacobs, or world holders, as they were called, and to which a peculiar importance is attached.

The forms of the Piqua letters are almost precisely those that occur about the Mediterranean, and whose phonetic values have been determined by Alois Hess. Major Beebe believes that he has been able to trace each form of letter to aboriginal American picture symbols, in which the same significance obtains in both European and American forms. Having fixed the significance of these letters, he has, he says, deciphered the inscription on the stone from the Grave Creek Mound, West Virginia, and that on the Pemberton ax. In all these cases the names deciphered refer to certain stellar combinations, and in the case of the slates and tablets, which are perforated, were probably in the nature of charms. In the case of the Pemberton ax part of the inscription is read with the edge of the ax up, the remainder with the edge down, and this inscription, too, probably, had reference to some rite or species of divination in which the ax played an important part.

A very significant feature in regard to this ax is, that the names read on the ax, when held with the edge up and down, have been preserved with the change of but one letter by an Esquimau tribe in Northwest America as the names of their deities of good and evil respectively, whereas the ax itself was found at Pemberton, N. J. The generally prevalent idea as to the relation of the Esquimaux and preglacial man makes this incident peculiarly suggestive.

The Crater of Kilauea.

Tourists to Kilauea will remember certain active pools of lava, the North and South lakes, which ordinarily bubbled and tossed a fiery flood at a depth of about 120 feet below the floor of the great crater. Now, says the Honolulu *Advertiser* of July 26, these lakes have all been filled up, and there have arisen peaks and cones of hard lava that rise over 100 feet above the south bank of the great crater, which is about 1,000 feet high. But there has burst forth a new opening in the great crater floor not far distant from the old lakes, a new lake, almost round in form, about 600 feet across, and 70 feet in depth, in ordinary stages, below the surrounding brink. Here the great Hawaiian volcano presents the most varied fantastic play of liquid lava. Sometimes it almost seems to sleep, and the disappointed visitor looks down into a black valley, and observes a smoking pit giving no more evidence of combustion than a tar kiln. The surface presents a dark silver gray hue, with a satiny shine. This is a crust of quiescent lava, and the observer who has expected to have his sense of wonder strained to speechlessness says: "Is this all?" No! look! the frozen, glassy lake is alive. What a



ELECTRIC FLYING MACHINE.

* Of course the idea of guiding balloons against strong winds belongs to Utopia; but for short voyages, such as escaping from a city during a siege, it would be very valuable to be able to steer the balloon.

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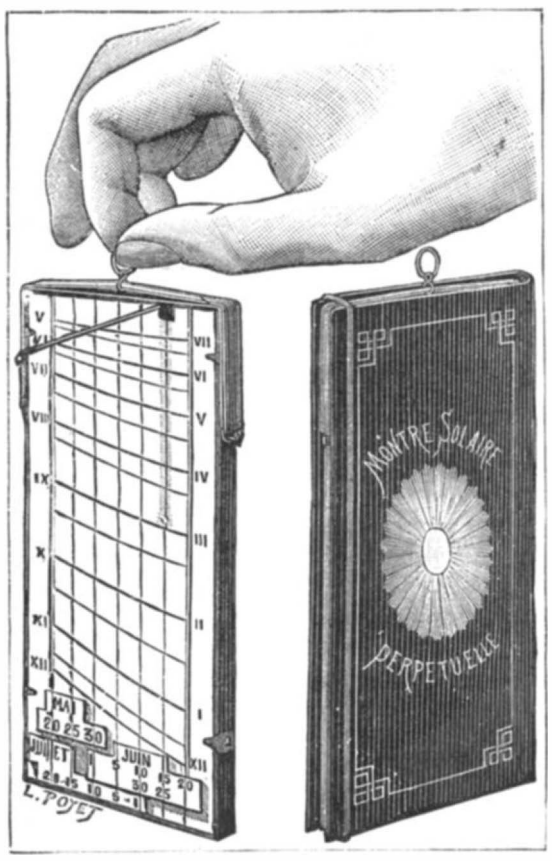
heave in the center—some mighty beast lifting up that floor! Now a wave runs round the incrusted marge, and there is an outburst, a blood-red fount, gushing and bubbling from one of earth's arteries. The broad disk of the lake heaves and trembles. Fitful gaseous flashes flit across. The moving floor cracks. A serrated fissure, like the suture of a skull, runs from marge to marge, and quick, darting streaks, sudden cracks of the crust, shoot across in all directions. These serrated streaks are at first rosy lines on the gray surface, then they widen like crimson ribbons, broadening to the view. They undulate with the billowy motion of the whole upheaving surface. Another crimson fount springs up along the now fretting and roaring rim of the lake, and another and another of the wildly up-leaping fountains of fire toss high their gory crests, even casting gouts and clots of the red spray that fall and harden near the observer's feet. By this time the spirit of our inferno is aroused. The fierce red lake is all boil and leap and roar. It is more than the roar of sea surfs. The surging tide of the molten earth sounds a deeper bass than any note of the sea; and the heaved-up crust, broken into fragments, is churned and dissolved in the boiling flood. The roaring gulf is now, indeed, a vortex of indescribable glories and terrors.

DE COMBETTE'S SOLAR WATCH.

Sun dials are of two kinds: in one the hour is indicated by the inclination of the shadow, and in the other it is shown by its length. The inventor of the very simple little apparatus represented herewith has chosen the latter mode.

The arrangement of the "watch" is as follows: To the sides of a block of mahogany are affixed four clasps, which serve for holding in place the cards upon which are inscribed the different months. In the engraving, we have the card for the months of May, June, and July. Over the top of the block extends a rubber band which is fixed to the sides by means of rings. A third ring, through which the band passes, serves for holding the apparatus. A steel needle having an aperture at one extremity serves for projecting the shadow on the card.

To use the apparatus, the unperforated end of the needle is placed between the wood and the rubber, on the line of the day of the month. Thus, in the cut it is on the line of the 15th and 20th of June. The apparatus is then held by the ring, and turned to the right or to the left until the shadow exactly coincides with the line. The luminous point projected by the eye of the needle indicates at the right the hour for the morning, and to the left that for the afternoon. It will be



DE COMBETTE'S SOLAR WATCH.

at once seen, on reading the card, that on the 20th of June the sun is at its greatest elevation, and that on the 25th it is at the same height as on the 15th; and that on the 1st of July it is at the same height as on the 10th and 30th of June, etc.

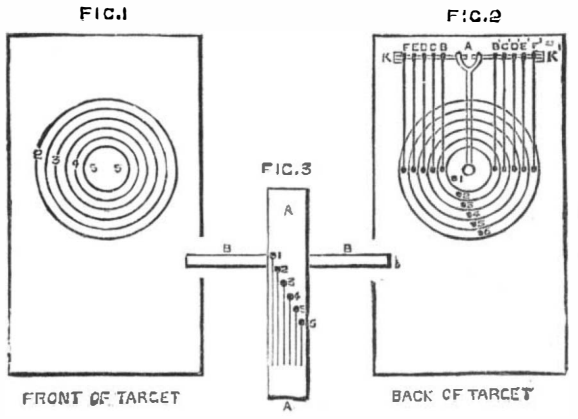
The figure to the right shows the apparatus inclosed in its case.—*La Nature.*

Scientific Exploration of the Northwest.

It is said on good authority that the Northern Pacific Railroad Company and the Oregon Railway and Navigation Company have united in putting a scientific exploring expedition into the field, for the purpose of examining into the mineral, agricultural, and other resources of the territory tributary to the two companies between Lake Superior and the Pacific coast. Prof. Raphael Pumpelly, until now in charge of the coal and iron department of the late national census, has been appointed chief of the expedition, and he has already started for Montana to examine the principal mining districts in that Territory. The work of the expedition will extend through several years.

SELF-REGISTERING TARGET.

The target here illustrated is the invention of Dr. Wilson, of Hawkhurst, Eng. It consists of a sufficiently thick plate of iron, out of which six circular disks or concentric flat faced rings of necessary breadth are made, as seen at Fig. 1. The rings must be of such diameters that there shall be a clear opening all round between each of them of about three-sixteenths of an inch or a quarter of an inch, so that the disk rings—see Fig. 2, back of target—hang by hooks of sufficient length on the cross rod, K K, and work on it, as an easy joint, may move backwards and forwards without



touching each other. They support in pairs—with the exception of No. 5—one of the disk rings, which form the face of the target, F F support ring 2; D E, D^1 E^1, support rings marked 3; B C, B^1 C^1, rings marked 4; and A supports 5, the bullseye. When the bullet hits the face of one of the disk rings, it swings back, but, by the ring's own natural weight, it immediately rights itself, and falls back into its original position. The spots, 1 2 3 4 5 6, are nipples or tongues. One is fixed in the back of each of the disk rings; and when the ring is suddenly forced back, its nipple plunges into a small hole—see Fig. 3—opposite, to correspond in the strong plank, A A, faced with iron, behind the target, and to which the target is fixed. The holes in A A, Fig. 3, are also marked 1 to 6; into these the nipple plunges deep enough to touch the sensitive needle, and through this medium sets a signaling apparatus in motion. The sensitive needle must be sufficiently deep in each hole to be entirely protected against any accidental breaking and flying about of pieces of the bullet. The electric apparatus can be made safe behind the broad plank, A A. On the inside of the crossbar, B B, Fig. 3, a short distance behind the target disk, there are pads or buffers, to deafen the harsh sound of the iron disk in dashing against an iron surface, and also to prevent the disk ring being thrown back too far by the impact of the bullet. In Fig. 1, 5 represents the bullseye; then 4 and 3 are each divided into two rings. If the bullet strikes on the opening between 5 and the inner ring 4, forcing both back, it would not be a bullseye, but the best position on 4; if on the inner ring of 4 only, it would be a more valuable position than if it struck on the opening between the two rings marked 4, forcing both back, but this position of the shot again would be still more valuable than if the bullet hit the outer 4 ring only. These hits would point out a relative value, say equal to 4¾, 4½, 4¼, 4, yet all equal to 4, but showing a difference, and they can be recorded with unfailing accuracy in the firing point at the moment the bullet hits the target. The rings marked 3 may be divided in the same manner. Thus eleven different values of hits may be recorded by this target. The hooks by which the disk rings hang require to be considerably bent outwards, all except F F, to allow the rings to swing sufficiently far back, and not touch any of the other's hooks.

Trade Schools in New York.

In the fall of 1880, under a joint arrangement between Richard T. Auchmuty, of this city, and the trustees of the Metropolitan Museum of Art, a technical school for the industrial education of artisans in the elements of mechanics and of design was established in a building specially erected and presented by Mr. Auchmuty for the purpose, and situated in First Avenue, near Sixty-eighth street. The school at once drew a large attendance. Classes were formed for practical instruction in drawing and design, decoration in distemper, modeling and carving, carriage draughting and plumbing, and no less than 143 pupils were enrolled. The school was open day and evening. Lectures were given by specialists in the trades and arts, but a prime feature was made of shop instruction by foremen and journeymen from factories in this city.

Since the schools were closed last spring a wealthy gentleman of this city has given $50,000 to the Metropolitan Museum of Art, to be devoted to the advancement of art education. It has, therefore, been deemed best to withdraw the art classes from the building at Sixty-eighth street and to establish them on an independent basis at Glass Hall, in Thirty-fourth street. The artisan classes will remain in the Sixty-eighth street building, and be known as the New York Trade Schools. The school for the decorative arts will be under charge of Mr. John Buckingham, former manager of the schools, and the trade schools will be under the supervision of Mr. Charles F. Wingate, sanitary engineer, who had charge last winter of the classes in plumbing and sanitary engineering.

The course of instruction for the coming year will embrace many new features. There is a large and well appointed workshop, where instruction will be given in the manual branches of the trades. Attached to this workshop will be a collection of the articles and materials used in plumbing. It is proposed to make this collection as complete as possible. Dr. Chandler, president of the Board of Health, and Professor Egleston, of the School of Mines of Columbia College, will take part in the series of lectures to be given to the class.

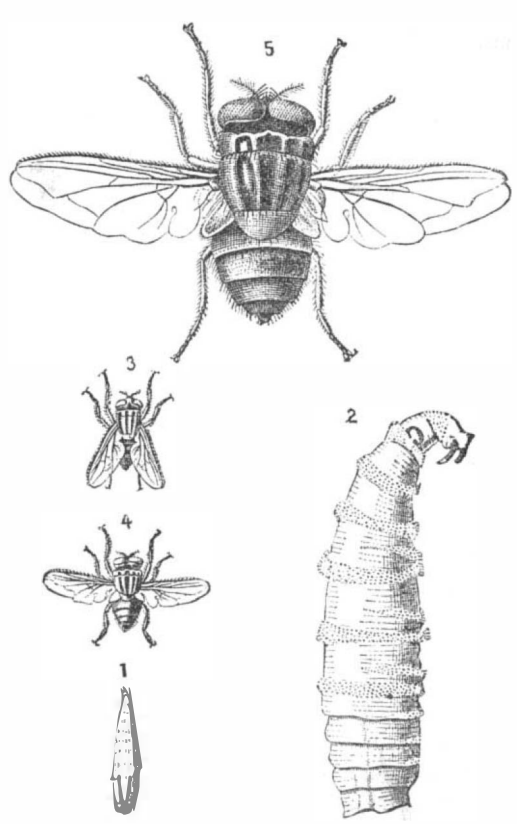
These trade schools are not intended to be either a charitable or a money making institution, the charges being based on the actual cost of the instruction given.

A DEADLY FLY.—NEW CASE OF MYIASIS OBSERVED IN THE ARGENTINE REPUBLIC.

Mr. P. Auguste Conil has recently described, in the *Annales des Sciences Naturelles*, some new cases of myiasis observed by him in the province of Cordoba (Argentine Republic). This affection, which is nearly always fatal, is brought about by a fly, *Calliphora anthropophaga*, Conil, represented herewith, and which, depositing its eggs in the nostrils of an individual, lays the germs of a horrible malady. We will allow Mr. Conil to describe in his own words one of the cases that he witnessed:

"The house situated alongside of mine is occupied by Mr. Auguste Ortiz, whose family lives at Totoral, a village lying sixty miles to the north of Cordoba, very near the line of railway connecting the latter with Tucuman. One of his sisters, Josefa Ortiz, aged 18, was taken sick, and experienced so acute pains that she decided to consult a physician, who, after questioning and examining her, said that she had an attack of angina and treated her for that affection. In spite of all the remedies administered, the pains, far from ceasing, increased in intensity, and the mother, justly alarmed, wrote to her son to consult another practitioner at Cordoba.

"He went at once to Dr. Lesbini, and gave him all the details that he had just received in regard to his sister's case. On Sunday, January 5, 1879, Josefa began to complain of insupportable itching in the right nostril, and, on the same day, had several attacks of bleeding at the nose. The days following she experienced violent pains in her face, nape of the neck, and throat. The physician in attendance, finding that he had made a wrong diagnosis, advised that the patient should be sent to Cordoba in order that she might be within reach of remedies and medical skill



CALLIPHORA ANTHROPOPHAGA.

1. Larva, natural size.—2. The same enlarged, side view.—3. The perfect insect, natural size.—4. The same, wings extended.—5. The same, enlarged.

"On the 14th of January her palate was perforated, and two larvæ, accompanied by matter, came out of her mouth. Having smelled a branch of basil, eighty larvæ, pretty well developed, escaped from her right nostril. The pains becoming more and more violent, Auguste Ortiz was notified and at once left for Totoral. Having arrived at home his sister's state seemed to him to be so grave that he resolved to take her with him to the city. He narrated in all its details the consultation that he had had with Dr. Lesbini, and said that, according to the opinion of the latter, Josefa's trouble was produced by larvæ, which, in the egg state, had been deposited in her nostrils by a fly. The relatives of the patient, notwithstanding the eighty-two larvæ expelled, could not believe such an assertion, as it appeared impossible that the *worms* that they had seen could come from a fly. They doubted it all the more, too, because the patient asserted that no fly had entered her nose.

"Struck by what she had heard, one of the sisters of the

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sick girl, and younger than she, stated that on the evening preceding a fly had entered *her* left nostril, and, since in the evening she had begun to experience the same symptoms as those exhibited at first by Josefa, the family began to think that Dr. Lesbini might be right. The trip was therefore resolved upon, and it was decided that Eliza should be one of the party, a decision to which she undoubtedly owes her life. On Saturday, January 18, at ten minutes past twelve the patient took the train. At the station Jesus-Maria she got out and walked around for a moment; this was at about half past one. When the train reached the station General Paz, at ten minutes before three, the patient's state was so much worse that her family was thrown into the greatest inquietude lest she should not arrive alive at her destination. At three o'clock, when the train started, the patient became senseless, and, shortly after leaving the station, she expired in her mother's arms. The corpse, having been taken to the brother's house, was examined by Dr. Lesbini and two of his confreres, who had been at once summoned. The former desired to make an autopsy, but the family was formally opposed to it.

"Dr. Lesbini's diagnosis was fully confirmed by the larvæ which came from the mouth and nasal fossæ of the patient, as well as by the perforation of the palate. There is no doubt, then, that Josefa died from the malady under consideration, *myiasis*, and that it was caused by the larvæ of *Callíphora anthropophaga*, which probably penetrated the brain and lungs."

After citing a large number of similar cases, Mr. Conil gives a careful study of the larva and perfect state of the dangerous insect.

"Resuming the data which precede," says Mr. Conil, it results that: an egg of the fly deposited on the 15th of January in the nasal fossa of Eliza Ortiz, hatched and had already, four and a half days afterward, attained a length of one-fifth of an inch; the larva had attained its entire growth and had transformed into a pupa eight and a half days after the egg was laid; and, finally, eleven days were sufficient for the pupa to perfect its forms and become transformed into a perfect insect. This makes in all nineteen days and a half for the cycle of its different metamorphoses.

"If we consider the quantity of eggs that each female of the diptera under consideration is capable of laying at one time, we shall be astonished at the relatively small number of cases of myiasis that occur, even taking into account that many cases cannot be ascertained by science and consequently are ignored. That the fly does not multiply to a greater extent, seeing its wonderful fecundity, must be due to the fact that some enemy holds it in check and prevents a multiplication which would be so pernicious to our species. What the enemy is the future will probably tell us; I hope so, at least, and if it is possible, I propose, next summer, to pursue my observations on the diptera, and to apply myself specially to biological observations."

Michigan Frogs and Frog Hunting.

The marshes between Detroit and Lake St. Clair are the resort of millions of frogs; and it is asserted that more frogs are sold in Detroit than in any other city of its size. During the frog season heavy shipments are made to New York, Boston, and other Eastern cities. The *Free Press*, which pronounces the commercial frog as suspicious as a wolf, as wild as a deer, and as shrewd as a fox, describes the work of frog hunting as follows:

"Most of the frogs are caught for this market by men. One or two boys have some fame as successful frog catchers, but it has been demonstrated that the average boy lacks the necessary qualificatious to make the business of any profit to him. We know of one old fisherman and hunter who has followed the frog catching business for the last twelve years, and he has sometimes made it pay as high as $15 per week. While there is only one way of killing a goose there are several ways of killing a frog. Frog hunting would be a great financial success if the jumpers would take a seat on a log and permit a man to walk up and crack 'em over the head with a club, but the frog is utterly opposed to any such proceeding. His eagle eye detects the enemy afar off, and the approach must be cautious. The outfit consists of a frog spear, a hook and line, a fish pole with a pointed iron in the end, and sometimes a small shotgun is taken along. First discover your frog. He may be sitting on a log ten feet from shore. He feels quite safe at that distance and will probably wait for developments. The hook and line can be used here. The line is stout and the hook big enough to hold a twenty pound bass. The idea is to fish for the frog without bait. A careful hand will maneuver the line until the hook is under the frog's throat, and then a sudden jerk takes him off his meditative roost and gives him into the power of his enemy. The spear, which is provided with a long handle, can sometimes be used, though a frog will dodge a sudden thrust as quick as a pickerel. If the shot gun is used it is with a light charge of powder and very fine shot, and the head is the point aimed at. Some of the froggers work the banks and are provided with boats, but success depends a good deal on circumstances. A good hunter has been known to bag 200 frogs per day, but three or four dozen legs are called a fair day's catch. A frog will probably live ten or fifteen years if steering clear of accidents. They are not worth catching until they are two years old, and are not "prime" until they reach the age of five. A frog sees his palmy days from five to ten. Before reaching five he is giddy and thoughtless. After that he settles down to a life of ease and contentment, and the days come and go and leave him no sorrow. Frogs have been caught in the St. Clair marshes weighing as high as seven pounds and having legs almost like drumsticks. One was caught at the head of Belle Isle two years ago which kicked the beam at nine, and one weighing only half a pound less was on exhibition at the Central Market last spring. Frog hunters say that the game they pursue is a weather bureau in himself. Before a storm he can be found only in certain localities. When there is to be a dry spell he seeks certain other localities. If the day is to be cool and cloudy his altitude betrays it. If it is to be hot and sultry the frog remains below. During a thunderstorm he is "on deck" to witness the display, and is then off his guard to such a degree that he is often killed with a club. His natural enemies are man, several species of birds, three or four species of fish, and one or two kinds of animals, and the fact that he manages to dodge all for years is proof enough that his lack of brains has been more than made good by his supple legs."

REMOVAL OF FLOOD ROCK, NEW YORK CITY.

The work of mining the seven acres of Hell Gate, known as Flood Rock, which is illustrated on our first page, was planned and barely commenced by Gen. Newton, U. S. Engineers, before his successful explosion of the extensive mine under Hallet's Point Reef, which took place Sept. 24, 1876, a full illustrated account of which appeared in the SCIENTIFIC AMERICAN of October 14, 1876, preceded by an illustrated history of the inception and progress of the work in current numbers of earlier dates. By this important operation there has been secured a clear navigable channel of 26 feet depth at low water, in place of the dangerous and dreaded whirlpool, called by the early Dutch settlers of New York "Horl Gatt," meaning whirl passage, which has become Hell Gate by modern usage. The name is now applied to the area including Flood Rock and other neighboring reefs.

The present work, begun in 1876, was suspended for want of appropriations during the whole of the fiscal year ending June 30, 1878.

Flood Rock is a ledge of gneiss, of about the same composition as Hallet's Point Reef, located about 1,000 feet northwesterly from Hallet's Point, at Astoria, L. I., where the machinery plant for mining that reef was located.

The summit of Flood Rock, as seen in the engraving, formerly appeared at all times above water. Its form was such that, by building upon it suitable retaining walls and cribs, an area of about a quarter of an acre was prepared for the necessary buildings and a hoisting tower at the opening of the shaft, which has been sunk from the apex of the ledge to a depth of about 75 feet, as shown in the section of the mine in our engraving.

The rock, as it was removed, was at first deposited by dumping scows in a deep hole off Ninety-second street, till it was filled to a desirable level. It is now being deposited between Little and Great Mill Rocks, an interval of about 800 feet, which with the rocks will form the western side or breakwater to the new channel formed by the removal of Flood Rock. This was included in Gen. Newton's original project for the improvement of Hell Gate.

A network of galleries, to plan of which is shown in the engraving, now extends under nearly five acres of Flood Rock. When the excavation is completed, piers only of sufficient size and in ample number to support the roof will remain.

The piers are then to be drilled, charged with sufficient explosives to break them down, and then fired simultaneously, when the whole mined area of the river bottom, shown by the fine cross lines now known as Flood Rock, is expected to sink into the mine, and after dredging, form a new channel of 26 feet depth at mean low water.

The amount of explosive to be employed was originally estimated at an equivalent of 100,000 pounds of nitro-glycerine.

The amount used at the former explosion at Hallet's Point was 52,000 pounds of explosive placed in 172 piers. The mine was fired by the touch of a child's hand, and Hallet's Reef was no more. There have since been dredged from this demolished reef a total of 72,084,078 gross tons of refuse, and only a few shoal points now remain, mostly near the shore.

The galleries thus far completed at Flood Rock have a total length of 13,528·08 lineal feet, from which 39,608·38 cubic feet of rock, measured in the original solid form, have been removed.

At the present rate of progress the mining will be completed about the close of 1883.

The machinery by means of which this important work is carried on is of the most approved types of modern mining appliances, and as much as possible of the labor is performed by steam, the prime motive agent. There are four large boilers, three of the horizontal two-flue type, 6 feet diameter by 24 feet long, set in brick, and externally fired, and one of the fire-box tubular or locomotive type. They have an aggregate of 140 square feet of fire grates, equal, at maximum rate of combustion with natural draught, to about 400 horse power.

The steam is maintained at 60 pounds constantly, but in a part only of this system of boilers, one or more being at all times available for cleaning and repairs. They furnish steam to the following engines and heating pipes: Five upright air compressors, steam cylinders, 9″ by 18″, which supply air to the small drilling engines (30 in all, a part only in use all the time), air pressure of 55 pounds per square inch; one double winding engine, having two cylinders 16″x24″ geared to a 7-foot winding drum by spur gearing about 1 to 7, which raises and dumps automatically into scows all the mined rock; one upright ventilating engine cylinder, 12″x18″, driving a fan 12 feet diameter; one small upright shop engine driving the machine shop and four smiths' fires; and one small double-cylinder freight hoister.

There are two ten-inch Worthington duplex mining pumps, one of which at about 75 to 80 strokes per minute, serves to drain the mines in the present condition of the leaks.

There are also three boiler feed-pumps and a special Knowles circulating pump, 8-inch water piston.

The drying chamber in the main gallery is also supplied with steam for the purpose of drying the clothing of the workmen.

The exhaust steam from all these engines is condensed in a large Lighthall surface condenser, and about two-thirds of the original feed water is returned in a purified condition and at about 100° F. to the boilers; when new and unusual leaks are developed by the blasts the second pump is used till they can be plugged by the miners, the parts thus plugged must be then approached from another direction.

The water is all taken to the pump well below the central gallery, through drains cut below the general floor level of the mine, thus leaving the gallery floors comfortably dry for the workmen.

There are now about 200 men, comprising miners, mechanics, and laborers, engaged on this work, in three shifts or watches of eight hours each, using from 20 to 30 drilling engines, which are driven by compressed air distributed from the five compressing engines through a large main, and smaller branch air pipes to the headings where each air-drilling engine has its separate flexible pipe.

Holes something over two inches diameter are now being made, each about four feet deep, at the rate of 31·72 feet per shift, by each active drill.

The blasting is done at night; the explosive used is No. 2 extra giant powder; as many as 300 holes have been fired (charges about one pound weight) in a single night, and then the ventilating fan, located at the top of the shaft, is run at its maximum rate, displacing about 50,000 cubic feet of air per minute.

Careful and experienced pioneers explore the galleries after each blast and test the walls and roof, and remove all loose rocks before the drillers and mining laborers return to work where blasting has been going on.

The detached rock is loaded upon small cars on 2½-foot gauge tracks and drawn to the shaft by mules, a number of which are stabled permanently in a chamber set apart for their use.

The cars are run upon a tilting cradle, which is pivoted upon the sill of the hoisting cage, and firmly secured to the cradles so that they may be safely dumped into the iron-clad chute at the top of the hoist-way, whence the rocks slide into the dumping scow alongside. The descending empty car counterbalances an equivalent weight of the ascending load in the adjoining lift, thus practically eliminating the cost of hoisting the cars as dead weight. The loaded scows are taken by a powerful tugboat to the dumping ground, the present state of which requires unloading upon dump cars upon the dike, as it is shown, nearly filling the space between Little and Great Mill Rocks, indicated in the engraving.

The history of the Hallet's Point mine, which may be found fully illustrated in the SCIENTIFIC AMERICAN of August 21, 1875, Sept. 30 and Oct. 14, 1876, shows the comparative cost of hand and machine drilling by compressed air to be 95 cents per foot for the former, and 36 to 37 cents for the latter.

The distribution of the whole cost of mining was then as follows:

Drilling and blasting	46·00	per centum.
Transporting in the mine	17·00	"
Hoisting	3·28	"
Dumping	2·03	"
Pumping	10·37	"
Incidentals, including costs of superintendence	21·32	"
	100·00	

The disposal of the rock from the new mine, which involves the use of a tugboat and dumping scows, modifies the distribution of the cost, making the item of dumping 7·17 per cent., while the incidental item which includes cost of superintendence is reduced to 10·4, or less than half that in the old work.

The works at Flood Rock are in charge of Gen. John Newton, U. S. A.

Imitation Amber.

Considerable quantities of beautiful objects of artificial amber are now being produced in Vienna. The substance employed in its manufacture is chiefly colophony or resin, obtained by decomposition of turpentine, though several other ingredients are used to give it the requisite qualities. The imitation is said to be perfect, and the production has even the electric properties of amber. Ingenious manufacturers have even introduced into the substance foreign bodies, insects, etc., to make the similarity more striking. Natural amber requires a temperature of 285 to 287 degrees C. to fuse it, while the imitation becomes liquid at a much lower temperature.

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A Fatal Torpedo Explosion at Newport.

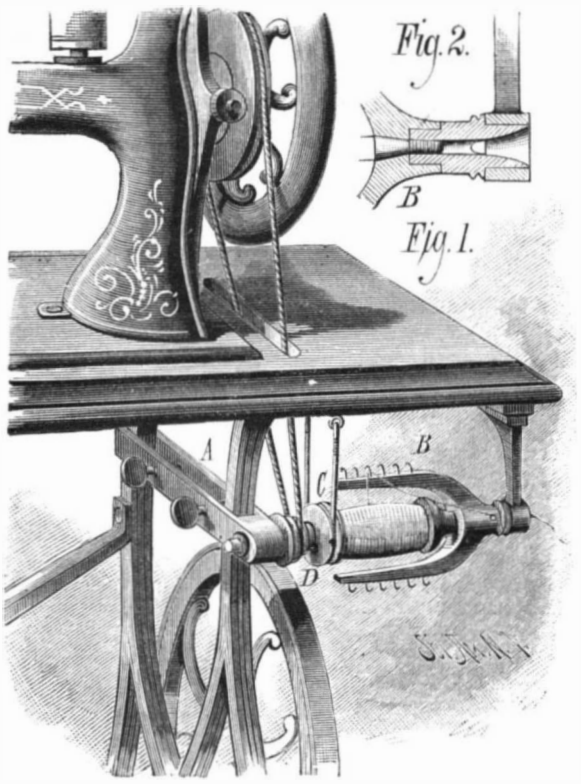
Recently two officers of the torpedo school at Newport, R. I., Lieutenant Commander Edes and Lieutenant Spaulding, were killed by the untimely explosion of a torpedo which they were placing in the harbor. According to the official report of Captain Thomas Selfridge, in charge of the torpedo station, the deceased officers were carrying out a torpedo in a small boat, when it exploded. The class had been previously instructed in all the details of the operation, and a diagram drawn that each one could see how the wires should lead, and special cautions had been given by the instructor, Lieutenant Commander Bradford. The torpedo was first to be planted. Then, of the two wires, one was to be connected to a circuit closing buoy, and the other to a firing circuit on shore. They had been cautioned not to make these connections after the torpedo was dropped until they had come ashore. As a further precaution, the wire connecting the firing battery with the torpedo in the electrical building was also disconnected, making three breaks, any one of which would make it impossible to fire the torpedo. It seems that the first torpedo planted by these officers became leaky, and in taking it up they cut the wires of the old torpedo without breaking the shore connections. In planting the new torpedo, being in a hurry, they pulled out and took up the wires from the water and connected it (the torpedo), supposing the connection in the electrical building was broken. It appears that Lieutenant Commander Caldwell, supposing, as should have been the case, that the connections of the torpedo were broken, joined this connection in the electrical building. The terrible result followed.

SPINNING ATTACHMENT FOR SEWING MACHINES.

The engraving represents a very simple spinning device, which can readily be attached to a sewing machine, and replaces the cumbersome spinning wheel generally used with hand machines for spinning. Fig. 1 is a perspective view of the device applied to a sewing machine, and Fig. 2 is a sectional view of the outer journal of the spindle.

A clamp, A, is secured to the leg of the sewing machine by thumb screws, and supports the spindle, C, flier, B, and the spool. The end of the spindle is furnished with a hollow flaring mouth.

To fit the attachment for operation the clamp, A, is to be attached to the legs beneath the table and directly over the driving wheel, with the spindle projecting in a horizontal direction, with space enough for the flier to clear the table. The bracket which supports the outer end of the spindle is then to be screwed into the table directly over and in line with the mouthpiece of the spindle. A tension band is passed around the grooved pulley of spool and secured to the table. The object of this band is to prevent the spool from turning as fast as the flier, and it can be made to turn as fast as required for taking up the thread by tightening or slackening the band by means of screws. The driving band is passed around the driving wheel of the sewing machine and around the cone pulley, D.



BLACKETT'S SPINNING ATTACHMENT FOR SEWING MACHINES.

This attachment will readily do all the work of the ordinary spinning wheels much faster, and it is much easier to work than spinning wheels. The attachment saves the necessity of having a spinning wheel where there is a sewing machine in use.

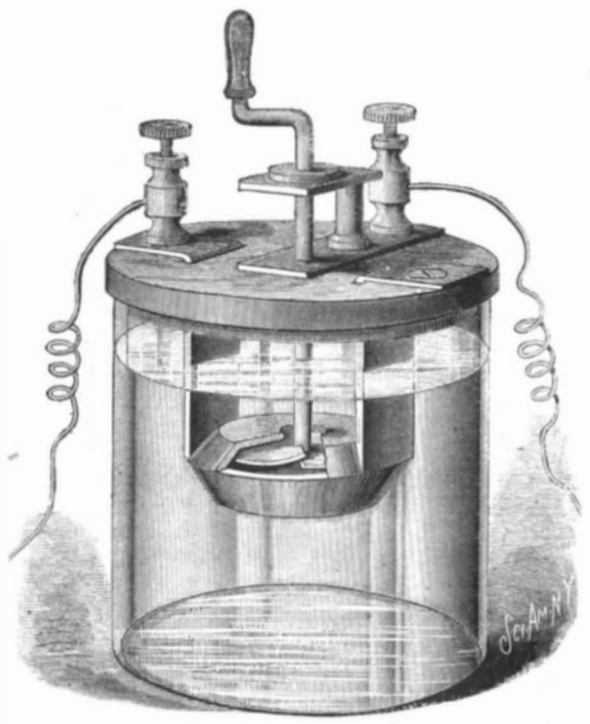
In many parts of the country a spinning wheel is just as much a necessity in every family as a sewing machine; but with this attachment to the sewing machine the large wheel will not be required.

For preparing yarn for crochet work and knitting the spinning and twisting attachment is especially useful.

This invention was recently patented by Mr. J. C. Blackett. All communications in regard to the invention should be addressed to Mr. J. R. Blackett, Caledonia Mines, Cape Breton, Nova Scotia.

AN IMPROVED BATTERY.

The engraving shows an improved galvanic battery lately patented by Mr. A. Floyd Delafield, of New York city. This battery is provided with means for increasing the strength of the current by producing a more or less rapid circulation of the solution in contact with the elements by mechanical means, operated by hand or by a motor. This is accomplished practically by fitting the negative element upon a shaft for revolution between the zinc plates, and for



DELAFIELD'S GALVANIC BATTERY.

increasing the effect the revolving disk is made in spiral form, something like a screw propeller, so that it creates a circulation of solution in the cell, thus continuously depolarizing the elements.

Pictet's New Steamer.

The Geneva correspondent of the London *Times* gives the following details concerning Professor Raoul Pictet's model steamer, which he expects to drive at the rate of 40 miles an hour:

Her dimensions are 16 meters long and 3·50 meters wide. When lying at anchor she will draw 33 centimeters fore and 44 centimeters aft; at full speed, 1 centimeter forward and 16 centimeters aft. The engine will be placed amidships, from which point to the stern the screw shaft and the keel form an inclined plane; the bows are long, tapering, and wedge-shaped. Professor Pictet reckons that his invention will lead to a great saving of fuel, inasmuch as a steamer built on his plan, after being started with, say, 100 horse power, may be kept up full speed with an expenditure of force equal to 30 horses. The form of the hull, on which the maintenance of the ship's equilibrium will depend, cannot be explained without a diagram. Professor Pictet is quite confident in the success of his invention, and his scientific previous achievements have been so remarkable that many people who cannot follow his reasoning have no hesitation in accepting his conclusions.

The Improvement of the Mississippi River.

The construction committee of the Mississippi River Commission, consisting of General Q. A. Gillmore, Major C. R. Suter, and Mr. B. M. Harrod, has for several months past been holding monthly meetings in St. Louis for the purpose of hastening the preparation of the outfit required for a vigorous prosecution of work under the appropriation of $1,000,000 made at the last session of Congress, all of which will be expended on the river below the mouth of the Ohio. As bad navigation on that portion of the river is invariably due to excessive widths produced by caving banks in concave bends, the first thing to be done is to stop this caving by suitable works of bank protection, such as a brush mattress weighted with stone or some other species of revetment or covering extending down from the crest of the bank into deep water. The next step will be to narrow the stream to such widths between the high river banks that the current, with the increased velocity produced by the narrowing, will scour out and maintain, even during the low river stages, the depths required for navigation. This will be done by contracting the stream, usually at points opposite the concave bends, through the agency of light, permeable dikes, placed either longitudinally or transversely to the shore, or both. These dikes, composed of brush hurdles, or of wire and brush screens, or some similar device, will allow the water to pass through them with more or less freedom, and, by checking without arresting the current, will convert large areas next the shore into stilling or settling basins, within which the river itself is expected, during the flood stage, to build up new banks and establish new and advanced shore lines by constantly depositing the solid matter which it transports, but which the unimpeded flow would carry down to the Gulf of Mexico. Works of this general character will be begun as soon as the working plant is ready upon nearly seventy miles in length of the worst navigation below Cairo, namely, about forty miles on the Plum Point stretch, above Memphis, and thirty miles in the vicinity of Lake Providence, above Vicksburg. Nothing will be done upon the levees. It is expected that work will begin about October 1.

The National Telephone Exchange Association.

The third semi-annual convention of this association was held in Saratoga, the second week in September. There were present at the first session 250 delegates, of whom 100 represented telephone companies. Among the prominent delegates were:

G. L. Wiley, assistant general superintendent of the Metropolitan Telephone and Telegraph Company; W. A. Childs and Francis Shaw, of the Law Telegraph Company; Henry W. Pope, of the Staten Island Telephone Company; Henry Metzger, general manager of the Pittsburg Telephone Company; William Sargent, the general superintendent and electrician of the Bell Telephone Company, of Philadelphia; Mr. Goodyear, representing L. Tillottson. C. B. Hotchkiss, John A. Roebling, Washburn & Moen, and other firms were represented. Among the subjects for discussion were these: The latest improvements in all the instruments used; underground wires; wire construction and kinds of wires; also a report on electrical disturbances interfering with the telephone service.

IMPROVEMENT IN TELEPHONES.

The engraving shows an improved telephone transmitter and receiver recently patented by Mr. J. A. Lakin, of Westfield, Mass. This instrument is especially intended for mills, railroad offices, and other places wherein much local noise disturbs the successful operation of the common telephone now in general use. This instrument consists of a square box, in which are placed both a transmitting and a receiving diaphragm. From the receiving diaphragm chamber two sound tubes extend to be received one in each ear. They are kept in place by a small spiral spring, tending to draw the tubes together, and thus keep the small rubber caps on the ends of the sound tubes in place in the ear. These caps shut out all extraneous sounds and confine the sounds of the receiving telephone, so that their full effect is felt on the ear.

The lower part of the box, as seen in the drawing, contains the transmitter, which is made very sensitive. It is claimed that this instrument will talk two hundred miles or more.

Pressing the button, as shown in the cut, brings the battery into circuit with the transmitter. The inventor of this instrument has given much time and study to the construction of telephones, beginning as early as 1869, although, as he informs us, most of his attention has been given to acoustics.

LAKIN'S TRANSMITTING AND RECEIVING ELECTRIC TELEPHONE.

For further information address J. A. Lakin, Westfield, Mass.

NEW INVENTIONS.

Mr. Henry Grabach, of Clyde, O., has patented an improvement in the manufacture of boots and shoes, which consists in securing the counter stiffener to the shortened lining by a line of stitches around its edge, the lining of heel portion terminating at the edge connection, so that the friction of the heel of the foot comes upon the stiffener and a portion of the usual lining is saved.

Mr. John Murray, of New York city, has patented a toy savings bank for children, so constructed as to connect amusement with the operation of depositing money in the banks. The invention consists in a toy savings bank having a slotted base with a money receiving compartment at its rear

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end, and at its forward end the figure of a tree having a slot in its rear side, the figures of a dog and cat connected with the base and tree by slides and springs, and a trip lever, whereby the weight of a coin dropped upon the said trip lever will release the dog, and the forward movement of the dog will release the cat, which will then run up the tree.

Mr. John S. Powers, of New Burlington, Ind., has patented an improved water gate, consisting of a base frame secured to the bottom of the stream, an inclined frame hinged at its upper stream end to the base frame, and supported at its down stream end by hinged standards having a crossbar attached to their upper ends, and wheels pivoted to their lower ends, and the stops attached to the base frame for the wheels of the supporting standards to rest against, so that the passage of animals will be prevented and the gate will be lowered to the bottom of the stream by a rise of water or an accumulation of rubbish.

An improved horse collar fastening has been patented by Mr. Samuel Peters, of Sydney, Nova Scotia, Canada. The object of this invention is to provide the extremities of the horse collar with a fastening whereby the collar can be conveniently opened and closed, and thereby readily adjusted to or removed from the neck of the animal.

Messrs. Frederick H. Hubbard and John J. Ashley, of Brooklyn, N. Y., have patented an electric plaster which is an improvement on that class of healing plasters which are designed to have the curative properties supplemented or increased by electrical currents.

Mr. Hamline Q. French, of New York city, has patented an improvement in the construction of roofs for vaults, mausoleums, and structures of similar character built of stone and intended for burial purposes. The object of this invention is to obtain a building without vertical joints, and one held together and locked at the roof, so that by the locking and the weight of the roof the structure shall be made as enduring as the material of which it is built.

An improvement in window-cleaning chairs has been patented by Mrs. Anna Dormitzer, of New York city. This invention is designed as an improvement on the window-cleaning chair for which Letters Patent of the United States Nos. 200,441, 206,935, 206,936, and 219,234 were granted and issued to the same inventor, respectively, February 19 and August 13, 1878, and September 2, 1879, and its object is to further simplify the construction of the chair, and make it less expensive and more complete and durable.

An improved store counter seat has been patented by Mr. Willis M. Corwin, of Glen Cove, N. Y. The invention consists in a store counter seat in which a bar carrying the seat is provided with a catch recess, a hinged bar pressed forward by a spring to carry the seat beneath the counter, a catch bar to engage with the recess of the seat bar to hold the seat in place when under pressure, and a spring to raise the seat bar from the catch plate when the pressure upon the seat is removed, so that the seat, when released from pressure, will be carried in under the counter automatically.

Mr. Jacob Katzenberg, of New York city, has patented an attachment for button-hole and embroidery sewing machines for use in laying cords along the edges of button holes for the purpose of filling out or raising the stitches that surround it, thus producing more finished and durable work.

An improved baling press has been patented by Mr. Alpeus D. Channell, of Sabetha, Kan. This improvement consists in the combination, with two hoppers and two baling boxes, of hinged doors, hinged connecting bar, and the hand lever, whereby the hay in the hoppers can be forced into the baling boxes to be carried forward by followers.

Messrs. William F. Miller and Charles W. Stover, of Tipton, Iowa, have patented a hog-cholera compound consisting of turpentine one pint, spirits of camphor one pint, cayenne pepper one half of an ounce, and carbolic acid one half of an ounce.

The revenue laws extending the bonding of whisky from one to three years make it necessary to increase the number or capacity of bonded warehouses, and it is desirable that the racks in such houses should combine great storage capacity with cheapness of construction. The most approved method of construction at present is to set up rows of upright timbers within the house, about three feet apart in one direction, and brace or hold them together with iron bolts and rods having nuts on each end, and to lay on these bolts and rods the stringers in one tier above another for supporting the barrels of whisky. Mr. Thomas J. Pottinger, of Gethsemane, Ky., has patented an improved whisky rack for bonded warehouses which reduces the cost of bonded warehouses for storing whisky.

Mr. William F. Leach, of St. Clair, Mich., has patented a portable steam auger having a rotary steam engine to operate the boring tool, handles for carrying and holding the engine, a breastplate for forcing the boring tool forward to its work, and a tool holder or coupling for connecting a boring tool with the engine.

A nail-holding and starting attachment for hammers has been patented by Mr. George C. Peeling, of Lock Haven, Pa. The object of this invention is to facilitate the driving of nails in places where they cannot be conveniently held by the hand.

Mr. Robert Gawne, of Toledo, O., has patented an improvement in propellers for vessels. A hollow cylinder is fitted in the vessel at the stern and extends through the stern post below the water line. A cylinder extends from the stern of the vessel to near the engine, its diameter being proportioned to the extent of rise and fall it is desired to obtain for the propeller. The propeller shaft is placed in line with the central axis of the cylinder, and carries a pinion that meshes with a gear wheel on the engine shaft. The pinion will thus be always engaged in any position to which the cylinder may be turned. By a semi-rotation of the cylinder the propeller is shifted from the highest to the lowest point, and can be thus positioned according to the load or the depth of the water. With a light load the propeller can be brought down into the water to obtain effective action, and with a deep-loaded boat the propeller can be raised in shallow water, as may be necessary.

An improved sand and water break has been patented by Messrs. Charles W. Maxson, of Point Pleasant, and Jacob W. Buck, of Freehold, N. J. The object of this invention is to prevent the bluffs or banks of a sea beach from being washed away by the waves or covered with sand.

URN FROM SEVRES.

SEVRES URN.

The engraving on this page shows a very elaborate urn from the porcelain factory at Sèvres. Both design and ornamentation are so well shown in the cut as to require no comment.

The Root of the Cotton Plant.

The value of the cotton plant (*Gossypium herbaceum*) has been increased by the discovery that the bark of the roots yield a promising dyestuff. Mr. W. C. Staehl reports that when the bark of cotton root is exhausted by alcohol of the specific gravity of 0·84, a dark reddish-brown liquid is obtained, which, when distilled to recover the spirit, leaves a resinous matter which amounts to 8 per cent of the original weight of the bark. The new product thus obtained appears black and shining, but when pulverized takes the color of cochineal. It dissolves in 14 parts of alcohol, 15 parts of chloroform, and 122 parts of benzol. It dissolves also in caustic alkalies, and is precipitated from these solutions by acids. Hydrate of potash colors green. Sulphuric acid dissolves it with a red-brown color.

Drying Hay by Artificial Means.

The system of drying hay by artificial heat, devised by Mr. W. A. Gibbs, of Gillwell Park, Chingford, Essex, has been before the public several years, and though its adoption has made slow progress, it is now being used by several well known agriculturists. Since the construction of the apparatus was first publicly described it has received several improvements, and it is now constructed with a single vibrating trough, along which the hay gradually traverses; the coke furnaces are combined in one with the trough, and shaking and vibrating mechanism upon two pairs of road wheels for easy transport, and the width has been reduced to seven feet.

A writer in the London *Times* recently saw the machine at work, and says that grass from a water-meadow was being put through the apparatus, encountering at first a hot blast of about 400°, which drives off the moisture in steam, following through other streams of less heated air, and being delivered in a condition of finished aromatic hay of rich green color. Each load of more than two tons was put through in fifty-five minutes, or a slightly longer time than it took a man to load it in the field. One feature, he says, in Mr. Gibbs' machine is its value for converting injured hay into good, wholesome hay, the fans blowing out dust and must, while the sulphurous gas from the burning coke is believed to destroy the germs of microscopic life which may be the cause of disease in live stock fed upon foul hay. It is suggested that were these hay driers in the hands of men who let out thrashing machines, and could work them at a time of year when little thrashing remains to be done, they would save an immense acreage of hay every season in splendid condition. Another system, which promises to be of even higher economic value, has recently, however, been described as in successful use for several seasons by Mr. Neilson, and more recently by Mr. Knowles, of Colston Bassett Hall, Bingham, near Nottingham. This system consists in thoroughly tedding and lightly scattering the grass as soon as cut by a machine, and so expose it to the withering action of the air, whether under sunshine or showers. In about two days the green hay, without any turning or other labor expended upon it, and whether wet or not, is, in its half-made condition, carted and stacked. The rick at once begins to ferment and heat, and the heat so generated is employed to finish the process of hay-making. The temperature to which the hay is allowed to rise is regulated, and the means employed for this and for draining off all the superfluous moisture have been thus described:

In the raised base or staddle on which the rick is to stand, whether that is an ironwork structure or raised earth, is laid an airtight pipe, which may be of earthenware, of from three inches to six inches diameter, joined with cement, and this tube or air passage communicates with a vertical one in the center of the staddle, and rising a short distance to the center of the height of the rick. An exhaust fan connected with the horizontal part of the pipe is situated at a short distance from the stack, in a building or otherwise. In case of a long rick, the horizontal pipe is continued along the middle of the staddle, and two vertical pipes are used. Each aperture at the junction of the vertical and horizontal pipes is fitted with a sliding damper, and can be opened or closed by a rod extending outside the bottom of the rick. In stacking the hay a vertical air shaft or chimney is formed over each aperture, by the common method of drawing up a sack of straw or a round chaff basket as the building of the rick proceeds; but these ventilating flues are carried up to only half the height of the stack. When the exhaust fan is set in motion, drawing air from the underground pipe and rarefying the air in the chimney, the replacement of that air can come only by currents penetrating the rick from the outside walls and roof, and gradually converging into the chimney in the center. By this exhaustion of the hot air and moisture out of the middle of the mass, cold air is induced to enter the stack at all points and to seek the central flue, bearing with it the excess of heat and the moisture, and cooling the whole substance of the rick. Very little power is required to drive a fan of the necessary size, and Mr. Knowles' five horse steam engine drives the fan when giving out a mere fractional part of its power. One horse, working a fan by means of an ordinary horse gear and intermediate motion, will do well; and two men turning a corn-dressing machine fan, arranged in connection with the air tube, have been able to accomplish all that was wanted for cooling a stack. With a gentle exhaust, the atmospheric air is caused to permeate every part of the rick in ample quantity for keeping down the temperature of the fermenting grass.

The writer referred to says: "Mr. Knowles has brought the internal temperature of a large rick from 130° down to 90° in the short period of forty minutes. In the rick while

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building he lays at various heights wooden tubes of bore large enough to admit a thermometer to be introduced on a lath, these tubes reaching horizontally from the outside to the center; and thus the heat of all portions of the stack can be examined. A temperature of 100° is considered the maximum at which it is advisable to let the fermentation work, the fan being set in operation as soon as the temperature approaches this. The same provision of air ducts and a manually operated exhaust fan has been employed with advantage in keeping barley and other corn stacks from heating."

This system of drying half-made hay or dry corn deserves to be made generally known, not only because of the large quantities of crops which may be saved by it, but because of the remarkable economy of labor which it secures. The system should, moreover, afford our agricultural implement makers an additional article of manufacture, by means of which the system might be carried out with facility.

New England Life Two Generations Ago.

Recently Mr. P. T. Barnum gave to his native village, Bethel, Conn., a bronze fountain costing $10,000. At the presentation Mr. Barnum described with rare felicity the manner of living to which he was born. He said:

"I can see as if but yesterday our hard-working mothers hatcheling their flax, carding their tow and wool, spinning, reeling, and weaving it into fabrics for bedding and clothing for all the family of both sexes. The same good mothers did the knitting, darning, mending, washing, ironing, cooking, soap and candle making, picked the geese, milked the cows, made butter and cheese, and did many other things for the support of the family. We babies of 1810, when at home, were dressed in tow frocks, and the garments of our elders were not much superior, except on Sunday, when they wore their 'go-to-meeting clothes' of homespun and linsey-woolsey. Rain water was caught and used for washing, while that for drinking and cooking was drawn from wells with their 'old oaken buckets' and long poles and well-sweeps.

"The first water works ever built in Bethel were got up by my father and Capt. Noah Ferry for their own exclusive use about 1820, 60 years ago. I distinctly remember seeing the lead pipes made in Capt. Ferry's barn. The water was brought from the spring belonging to Esquire Benjamin Hoyt, on Hoyt's Hill.

"Fire was kept over night by banking up the brands in ashes in the fireplace, and if it went out, one neighbor would visit another about daylight the next morning with a pair of tongs to borrow a coal of fire to kindle with. Our candles were of tallow, home-made, usually with dark tow wicks. In summer nearly all retired to rest at early dark, without lighting a candle except upon extraordinary occasions. Home-made soft-soap was used for washing hands, faces, and everything else. Families in ordinary circumstances ate their meals on trenchers (wooden plates). As I grew older our family and others got an extravagant streak, discarded the trenchers, and rose to the dignity of pewter plates and leaden spoons. Tin peddlers, who traveled through the country with their wagons, supplied these and other luxuries. Our food consisted chiefly of boiled and baked beans, bean porridge, coarse rye bread, apple sauce, hasty pudding, eaten in milk, of which we all had plenty. The elder portion of the family ate meat twice a day, had plenty of vegetables, fish of their own catching, occasionally big clams, which were cheap in those days, and shad in their season—these were brought from Norwalk and Bridgeport by fish and clam peddlers. Uncle Caleb Morgan, of Wolfpits or Puppytown, was our only butcher. He peddled his meat through Bethel once a week. It consisted mostly of veal, lamb, mutton, or fresh pork, seldom bringing more than one kind at a time. Probably he did not have beef oftener than once a month. Many families kept sheep, pigs, and poultry, and one or more cows. They had plenty of plain, substantial food. Droves of hogs ran at large in the streets of Bethel.

"Our dinner several times each week consisted of 'pot luck,' which was corned beef, salt pork, and vegetables, all boiled together in the same big iron pot hanging from the crane, which was supplied with the iron hooks and trammels, and swung in and out of the huge fireplace. In the same pot with the salt pork, salt beef, potatoes, turnips, parsnips, beets, carrots, cabbage, and sometimes onions, was placed an Indian pudding, consisting of plain Indian meal mixed in water, pretty thick, salted and poured into a home-made brown linen bag, which was tied at the top.

"When dinner was ready the Indian pudding was first taken from the pot, slipped out of the bag, and eaten with molasses. Then followed the 'pot luck.' I confess I like to this day the old fashioned 'boiled dinner,' but doubt whether I should relish a sweetened dessert before my meat. Rows of sausages, called 'links,' hung in the garret, were dried, and lasted all winter.

"There were but few wagons or carriages in Bethel when I was a boy. Our grists of grain were taken to the mill in bags, on horseback, and the women rode to church on Sundays, and around the country on week days on horseback, usually on a cushion called a pillion, fastened behind the saddle, the husband, father, brother, or lover riding in front on the saddle. The country doctor visited his patients on horseback, carrying his saddle-bags, containing calomel, jalap, Epsom salts, lancets, and a 'turnkey,' those being the principal aids in relieving the sick. Nearly every person, sick or well, was bled every spring."

In Mr. Barnum's boyhood the richest man in town was actually worth as much as $3,000.

California Silk Exhibits.

In view of the new life which silk culture is assuming, it is worthy of note that the exhibits of silk winding appliances and silk products are very rich in this year's Mechanics' Fair, San Francisco. The *Mining and Scientific Press* says: First are the handsome and well filled cases of Joseph Neumann, a pioneer in California silk culture and manufacture. His position is on the main floor, near the musicians' stand. His exhibit is an unusually large one, occupying one elevated glass stand and a glass case. Both in variety and quantity of cocoons and raw silk, the display is remarkably good, and reflects great credit upon the exhibitor for the care, perseverance, and expense he has gone to in endeavoring to build up this industry in California. Several pyramids representing the silkworms spinning their cocoons are shown, besides over twenty cases of cocoons, all raised in this State. These latter represent many different varieties, from the smallest up to the full size of the French annual. The specimens of raw silk exhibited are very fine, and establish, as clearly as it is possible to do, that the silk manufactured from the worm bred in this State is, in its raw condition, equal to that of any country in the world. Mr. Neumann, through his own unaided individual efforts, has done much to establish this, and he is deserving of every praise for it. Interspersed among his exhibits are the different medals (nine in all) that have been awarded his exhibits in other places and countries, the whole constituting a well arranged display of silkworm productions and the marks of appreciation extended toward them by others.

The two other exhibits of silk may be found adjoining each other in the east gallery. One of these is by the California Silk Culture Association, which is the name chosen by a large number of energetic and public spirited ladies for their society, which is now the most active agency in awaking new interest in silk culture. The society has already enlisted a large number of ladies in different parts of the State in sericultural experiments, and the results thus far obtained are very encouraging. The exhibit of the Silk Culture Association is very comprehensive. It contains, first, a collection of wild silkworm moths from India and China, as also a number of the ordinary kinds. They are the property of Dr. Behr, of this city. In cocoons, the finest exhibit is that made by Mrs. S. A. Sellers, of Antioch. It is made under the auspices of the association, and comprises the following different varieties, all of California growth: French annual, Japanese annual, and bivoltines. The French annual cocoons are considered the best for manufacture, being also the largest. The bivoltines, or, as the name signifies, bi-annuals, are the smallest varieties. In addition to the cocoons, Mrs. Sellers exhibits a lot in different colors of reeled raw and floss silk, together with a number of silkworm eggs and moths. The display is a very complete one, occupying one entire large case, and would do credit to any exhibition in the world. The other exhibitors in the stall of the California Silk Culture Association are Mrs. Keeney and Mrs. McLean, of San Rafael; Mrs. Dodson, of Red Bluff; Mrs. James G. Whitney, San Francisco; Mrs. F. Dennis, Sutter Creek; and Mr. Bettleheim, of Antioch. The newly invented frame for silkworms to wind cocoons, the idea of Felix Gillett, of Nevada City, is worthy of notice, as are two very fine specimens of the California wild silkworm moth. It is stated that a very similar kind of moth to the California one is found in some portions of Tartary, and that the people make from it a rough silk cloth that gives unending wear. Garments made from it have been handed down by the Tartars from generation to generation, from time immemorial. Mrs. T. H. Hittell, the indefatigable Secretary of the California Silk Culture Association, has some interesting old German illustrated works treating of the silkworm and silk culture, and Miss Mary Wackenreuder, of San Bruno, has a very pretty imitation in wax of the mulberry tree, and the silkworms feeding. The operation of reeling the silk from the cocoons may be seen on Wednesday and Saturday afternoons.

One of the most striking displays in the pavilion is that of the California Silk Manufacturing Company, of this city. It consists of a large upright glass case filled with silk manufactures, chiefly spool silk. There is an architectural method of showing this spool silk, which shows much skill, and presents a charming effect. An excellent imitation of the State Capitol at Sacramento, and the steps approaching thereto and the lawns approaching it, is all made of silk manufacture. The building is wholly of spools of selected colors and embracing all kinds of silk thread.

New Dental Alloy Amalgam.

Dr. Henry S. Chase, of St. Louis, Mo., in a paper read before the Wisconsin State Dental Society, says his new alloy is made as follows: Melt forty pennyweights of pure silver; add to this thirty pennyweights pure tin; stir it, then add five pennyweights of antimony and five pennyweights of pure tears of zinc. When mixed, add thirty pennyweights of pure tin again; stir, and throw on the surface of the "melt" one half ounce of beeswax to burn off; and while burning, pour the "melt" into the *cup* of a vulcanizing flask to *cool*. Cut it up with very coarse file. Remove every particle of iron with horseshoe magnet. This amalgam must be washed in alcohol while mixing with mercury. Squeeze it in dry buckskin. This amalgam is *whiter* for washing, and takes less mercury. Squeezing injures some amalgams; it does not hurt this. The amalgam pellets must be dry when placed in the cavity. This amalgam remains very white in the mouth. If *all* the tin should be melted at once, the antimony and zinc would never melt. If the antimony and zinc are put in the melted silver before the tin, then the antimony and zinc will burn up or oxidize.

Three-high Rollers.

The Lauth three-high mill, for rolling sheet iron or steel and plates, is rapidly gaining in favor in Germany, Belgium, and France. In the beginning, as Daelen reports in the *Zeitschrift des Vereins Deutscher Ingenieure*, some trouble was experienced by reason of the fact that the middle roll wore rapidly. This was caused by the adhesion of cinder to the roll, and its being passed through over and over again. This has been done away with by suitable stripping devices. Krupp has built a sheet mill for steel, having 26·4 inch top and bottom rolls and 15·2 inch middle roll, the maximum thickness of plates entering the rolls being 0·5 inch. In turning out 0·06 inch sheets, the engine makes 60 revolutions; it makes 50 for 0·04-inch sheets, 40 for 0·03 inch sheets, and 30 revolutions below that gauge. The engine has an automatic Corliss gear, a 37·6 inch cylinder, and 62·80 inch stroke. A Lauth three-high plate train at the same works has 35·6 inch top and bottom rolls, and a steel 17·80 inch middle roll, which is raised and lowered mechanically before every pass. The mill is run at the rate of 50 to 60 revolutions per minute.

Rapid Progress in Texas.

A special statistical edition of the Galveston *News* shows that 1,634 miles of railway have been completed in Texas within a year, and that within two years 41 additional towns of commercial importance have been reached by rail or have sprung into existence, and that the value of the State's products has increased from $57,820,141 in 1878–79 to $95,960,930 in 1880–81. The amount and value of the chief staples of the State for the past year are: Cotton, 1,260,247 bales; value, $56,711,115; wool, 20,671,839 pounds; value, $4,754,522; hides, 12,262,052 pounds; value, $1,471,446; cattle, 781,874 head; value, $15,923,018; horses and mules, 28,175 head; value, $1,408,750; grain, 39,665 car loads; value, $6,941,375; lumber, 278,609,542 feet; value, $5,572,191; cotton seed cake and oil, $1,242,315; miscellaneous products, $1,344,728; sugar and molasses, $591,470. Total value, $95,960,930.

There has been expended during the year for railroad construction within the State something like $20,000,000, which added to the above would give a grand total of $115,960,930 as the sum derived by Texas to the credit of its industrial and agricultural resources, or fully double that of the year 1878–79.

An Electric Storm at Sea.

The German war schooner Nautilus reports passing through a singular storm while crossing the South Pacific from Tahiti to Sydney, Australia.

On the afternoon of May 11, the whole heavens appeared to be enveloped in cloud, which made it so dark that the crew could scarcely see the length of the ship. The thunder became deafening, and the flashes of lightning almost blinded the sailors' eyes. All around the vessel the lightning was striking the water, so that persons on board expected the vessel itself would be hit. But this they were spared. The effect, however, was singular and grand, and at times the vessel appeared to be in flames in several places at once. Bolts of lightning on several occasions fell to the water within 20 or 40 yards of the ship's side. While this peculiar storm lasted very little rain fell and the sea was almost entirely still.

Reversing the Wheels.

Experiments lately made at Blackburn with a train made up in imitation of that of the express which ran into the train standing in Blackburn Station, to test the statement of the driver that he reversed his engine as soon as he found the brakes did not check his train, are of some interest, though they elicited the fact that the reversal of an engine of a train running at a high velocity has but a very small effect in reducing the speed. A high speed was attained, and the engine was reversed a quarter of a mile before reaching the station, but the train ran through the station at about twenty miles an hour, and had to be stopped by the brakes. Locomotive driving wheels, when running the reverse way, are not effective in stopping a train. The experiment shows how little can be gained by reversing an engine under such circumstances.

The Largest Land Owner on the Continent.

Colonel Dan Murphy, of Halleck's Station, Elko County, came to California in 1844, and may be said to have made the country pay him well for his time. He is now probably the largest private land owner on this continent. He has 4,000,000 acres of land in one body in Mexico, 60,000 in Nevada, and 23,000 in California. His Mexican grant he bought four years ago for $200,000, or five cents an acre. It is sixty miles long and covers a beautiful country of hill and valley, pine timber, and meadow land. It comes within twelve miles of the city of Durango, which is to be a station on the Mexican Central. Mr. Murphy raises wheat on his California land, and cattle on that in Nevada. He got 55,000 sacks last year, and ships 6,000 head of cattle a year right along.—*Reno Gazette.*

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A Japanese Earthquake Record for 2,000 Years.

The *Japan Gazette* prints a translation from a noted *O-Jishin Neudarki*, giving a calendar of earthquakes in Japan for 2,000 years. A summary of the record is printed in the San Francisco *Bulletin* of July 25.

The first entry in the Japanese chronology is 295 years B.C.: "In the fifth year of the reign of Kôrei-tei, the seventh Emperor, the earth in the province of O-mi sank down, and in one night was changed into a lake. During the same night Fujiyami was upheaved. This was the first earthquake." The presumption is that this was the first of which there is any authentic record in Japan. We here have the origin of the famous and sacred mountain of Japan, provided the account is correct. An earthquake which made a part of one province into a lake, and raised a mountain nearly 17,000 feet high, certainly ought to have an authentic record. It is known that a mountain was lifted out of the plains in one of the States of Mexico in comparatively modern times. The next notation is about the year 412 A.D., when there was a "strong earthquake." Here is an interval of about 700 years in which no convulsion was severe enough to make a part of the ancient record, or if so the record as now read is silent. From the year 600 A. D. earthquakes were frequent. Coming down to the year 976, the record says there was "the greatest earthquake that ever took place, and the shaking continued for over 200 days." In the year 1510 it is noted that the shaking continued 75 days, and during this time a stone portal of one of the great temples was broken down.

A great earthquake is noted in 1595, during which a large temple was destroyed. In 1703 "the earth shook for 200 days in Kuanto, or the eight Eastern Provinces." In 1707 a great earthquake took place in Osaka. "Men and women escaped into boats, but they were all drowned by the sudden rising of the waves." In the southern and northern divisions of the town, 620 dwelling houses were destroyed by the shock. The number of the killed in the southern division was 3,620; in the northern, 2,331. The number of the killed by the waves in the southern division was 12,000 souls, and in the northern 12,030; 22 bridges were destroyed, and the waves rolled up with thousands of ships as far as Dôtombori. The number of the killed was counted in all at 29,981. At this time blue mud gushed forth along the shores of the Provinces of Kii, Ise, Mikawa, and Totomi, and many lives were destroyed by the sudden rolling in of high waves. Fujiyama shook and erupted. Ashes fell in the neighboring country. At this time Hôyeizan was created. Hôyeizan is a parasitic cone on one side of Mount Fuji.

The intervening earthquakes are not here noted, because there is no statement of any destructive results. In 1751 an earthquake is noted at Takata. "During this time the mountain slipped down, and 10,000 lives were lost." During the earthquake of 1847 many persons were killed. In 1854 there was a severe shock. "The dead were innumerable. Those who died by the high waves at Okata were numbered at over 6,000." A list of the towns and provinces is given where the earthquake was the most severe. This was apparently the greatest earthquake ever known in Japan:

"In Osaka, a great many ships were destroyed and persons killed by the high waves which rose after the earthquake. In the river Aiikawa, 174 junks and 180 boats of various descriptions and 150 persons were destroyed. In the river Kidzukawa 590 junks were destroyed. Up to the 11th day of the 11th month (1854, December 30) over 600 bodies were drawn out of the river. Counting the dead of various provinces there were over 6,000. In every part of the city buildings of various descriptions, such as Buddhist and Shinto temples, towers, bridges, theaters, etc., were destroyed and burned. Consequently in many quarters of the city a vast number of human beings died. The sea shores and river sides were damaged, and ships of every kind were destroyed, while the men who were in them almost without exception lost their lives. In the neighboring countries or villages the damage was equally great. The commencement of the shake was at half past the fifth hour, that is, at 9 o'clock in the morning of the 12th. From this hour the shaking continued almost unceasingly until 4 o'clock in the afternoon of the 13th day, when the greatest shock occurred. After this no more severe shocks were felt. Several buildings were destroyed and men were killed. At Nagoya, in the Province of Owari, the shaking was severe on the 4th and 5th days of the 11th month (1854, Dec. 23 and 24). Great numbers of houses were destroyed, many being attacked by waves. High waves of about twenty feet in height rolled over the rice fields of Chitagori, and in three places large dikes were injured. Houses at Susaki, O-i, Kamezaki, etc., were destroyed. In Yawata, in the Province of O-mi, buildings of various descriptions, such as dwelling houses, Buddhist and Shinto temples, etc., were leveled to the ground. The damages in Hikone and Nagahama were about equal. The damages in Samegai were also great. Mount Yorozan slipped down, and the clear water of the neighboring streams became muddy. Seven or eight tenths of Kano and O-gaki were also injured. More than one-half the houses in Sunomata suffered, and mud gushed forth from fissures in the earth. Two-tenths of Hagiwara and eight-tenths of Inaba were also destroyed. In a village between Niizaka and Nakago the earth was split to a depth of four or five feet, and the level of the earth was made uneven. Yokosuka, between Okitsu and Yejiri, was half destroyed. Shimidsu, a harbor between Yejiri and Fuchui, was very much damaged. The houses were all reduced to ashes and taken by the waves far out to sea."

A list of about fifty places is given where the waves were very high and a great deal of destruction was wrought. The earthquakes appear to have lasted through the latter half of the year 1854. The earth opened in seams several feet wide for miles in extent, provinces were inundated, cattle and men destroyed. As late as December 23 of that year it is noted that great waves rolled up the rivers, and a great number of ships were destroyed. At Yusa 600 houses were swept away by the waves. At the village of Hiroura, out of about 1,000 houses, all but three were carried by the waves out to sea. In a number of other villages it is noted that half the houses were carried away by the waves. Then follows another list of towns where the earthquakes of that month or the tidal waves were the most destructive:

"Shook actively in Kojima, in the Province of Awa, and the seventh part of the city was destroyed or else burned by fire. High waves rolled up in Tanabe and Kumano, in the Province of Kii, and all the ships which were near the shore and on the river banks were thrown up and utterly wrecked. Waves equal in force to these attacked several other places. In some villages not only the houses but also the animals were swept entirely away."

The record ends with 1854.

The British Science Association.

The annual meeting of the British Association for the Advancement of Science began in York, England, August 31. It is known as the jubilee meeting, the first meeting of the association having been held in the same city just fifty years ago. It has met in York but once since, in 1844. An interesting feature of the jubilee gathering is a loan collection in which the instruments of scientific research used half a century ago will be contrasted with those now in use, with as complete a chain of intermediate links as can be obtained. Below is a list of the presiding officers of the association from 1831 to 1881, with the places of meeting:

Year.	Met at.	President.
1831	York	Lord Fitzwilliam.
1832	Oxford	Dr. Buckland.
1833	Cambridge	Professor Sedgewick.
1834	Edinburgh	Sir T. M. Brisbane.
1835	Dublin	Dr. Lloyd.
1836	Bristol	Lord Lansdowne.
1837	Liverpool	Lord Burlington.
1838	Newcastle	Duke of Northumberland.
1839	Birmingham	Rev. W. Vernon-Harcourt.
1840	Glasgow	Marquis of Breadalbane.
1841	Plymouth	Dr. Whewell.
1842	Manchester	Lord Ellesmere.
1843	Cork	Lord Rosse.
1844	York	Dean Peacock.
1845	Cambridge	Sir John Herschel.
1846	Southampton	Sir Roderick Murchison.
1847	Oxford	Sir R. H. Inglis.
1848	Swansea	Marquis of Northampton.
1849	Birmingham	Rev. T R. Robinson.
1850	Edinburgh	Sir David Brewster.
1851	Ipswich	Professor Airy.
1852	Belfast	Colonel Sabine.
1853	Hull	Mr. William Hopkins.
1854	Liverpool	Lord Harrowby.
1855	Glasgow	Duke of Argyll.
1856	Cheltenham	Dr. C. G. B. Daubeny.
1857	Dublin	Dr. Lloyd.
1858	Leeds	Professor Richard Owen.
1859	Aberdeen	Prince Albert.
1860	Oxford	Lord Wrottesley.
1861	Manchester	Mr. William Fairbairn.
1862	Cambridge	Professor Willis.
1863	Newcastle	Sir William Armstrong.
1864	Bath	Sir C. Lyell.
1865	Birmingham	Professor Phillips.
1866	Nottingham	Mr. W. R. Grove, Q.C.
1867	Dundee	Duke of Buccleuch.
1868	Norwich	Dr. J. D. Hooker.
1869	Exeter	Professor Stokes.
1870	Liverpool	Professor Huxley.
1871	Edinburgh	Sir W. Thomson.
1872	Brighton	Dr. W. Carpenter.
1873	Bradford	Dr. A. W. Williamson.
1874	Belfast	Professor Tyndall
1875	Bristol	Sir John Hawkshaw.
1876	Glasgow	Dr. Andrews.
1877	Plymouth	Dr. Allen Thompson.
1878	Dublin	Mr. Wm. Spottiswoode.
1879	Sheffield	Dr. G. J. Allman.
1880	Swansea	Professor A. C. Ramsay.
1881	York	Sir John Lubbock.

Nearsightedness in Schools.

The results of an inquiry into this subject are given in a recent number of the *Elsass-Lothringische Volkschule*, showing that myopia is greatly spreading amid the boys and girls of the German schools, the mischief being more marked as the children get up into the higher classes of the schools. The number of shortsighted in the elementary classes was 5 to 11 per cent (the examination embracing 10,000 children); in the higher schools for girls the proportion was from 10 to 24 per cent; in the *realschulen*, between 20 and 40 per cent; in the gymnasia, between 30 and 55; and in the two highest classes of all, between 35 and 88 per cent. A physician at Tübingen has found in an examination of 600 students of theology 79 per cent suffering from myopia, and he attributes this frequency to the small, crabbed print of the dictionaries. No doubt, also, a large proportion of the children's shortsightedness arises from defective living and bad sanitary conditions. In connection with this branch of the subject may be mentioned the report of a society at Leipsic for enabling children under this condition of life to be sent either to the seaside or the country. During 1880 there were 131 children sent away, namely, 67 boys and 64 girls. Of these 119 were forwarded to the Ergerbirge, and the remainder to the baths at Frankenhausen, in Thuringia. During the six weeks of the stay the average weight of each child increased to about 1¼ kilogrammes, the measurement of the chest in nearly every case was also increased, and the sight of many perceptibly improved. The expense of the visit per child was about £2 13s.

RECENT INVENTIONS.

Mr. Charles O. Nyqvist, of Brooklyn, N. Y., has patented an improved storm rudder which enables seamen to readily control their vessels should the rudder become unshipped or disabled in a storm. The invention consists in placing rudders on the sides of vessels, and in arranging suitable mechanism for operating the rudders, whereby the vessel can be guided and controlled should the ordinary rudder become disabled.

An improved car coupling has been patented by Mr. George Holforty, of Sedgwick, Kan. The invention consists of a vertically sliding spring-actuated connecting bolt which engages with the head of the connecting link upon three sides, the bolt being adapted to move in ways formed in the drawhead.

Mr. William H. Howland, of San Francisco, Cal., has patented an improvement in machines for grinding ore. These improvements relate to machines for grinding ore, either wet or dry, and for grinding paints and other materials. The inventor makes use of a pan-shaped receptacle for the material with a ring-shaped bed, and fixed around a central shaft carrying the driver. The driver consists of a conical sleeve, to which the grinding blocks are hung, so as to be thrown out centrifugally by rotation of the driver. A pipe supplies air or water within the driver, from which it passes to the grinding surface, and acts to carry the ore or other material outward.

An improved fish and game trap has been patented by Messrs. Gottlieb Rentz and Frank. H. Herzog, of Quincy, Ill. This invention consists in a wire with hooks at the ends, and a spring coil in the middle, forming two shanks, which are provided with short bends to receive the end of a spring trigger when the two shanks are crossed. When the animal bites or nibbles at the bait the spring trigger snaps upward, thus releasing the spring shanks, which are forced apart in the mouth of the animal.

An improvement in bottle washers has been patented by Mr. Lawrence Wagner, of Jefferson City, Mo. The object of this invention is to provide a safe, speedy, and simple method of cleaning bottles.

Mr. Armand Muller Jacobs, of Moscow, Russia, has patented a process of preparing a mordant for use with alizarine in dyeing in turkey red color, which consists, first, in uniting about two hundred and twenty parts of oil or fat and fifty parts of sulphuric acid, the mixture being stirred for about three hours until a temperature of 30° to 45° Reaumur is reached, and then left at rest for about twelve hours; secondly, adding to this mixture a watery solution of crystallized soda, and allowing the whole to stand about twenty-four hours; thirdly, drawing off the neutralized oil and adding about twenty-six parts of aqua ammonia.

An improved temporary binder has been patented by Mr. George H. Reynolds, of New York City. The invention consists in combining with a book cover a stiffener having strips, flanged plates apertured and attached to covers at each end, metallic strips that are passed into the folds of the papers, and a slotted studded tube carrying a spring catch.

An improved millstone face has been patented by Mr. George A. Coles, of Middletown, Conn. The object of the invention is to save middlings by preventing the granules formed in the furrows from being crushed or pulverized by the lands as the middlings make their way toward the skirts of the stones. The invention consists in connecting the main furrows of a millstone by channels made at right angles to a given radius of the face of the stone, and being limited in extent by the furrows and distributed over the working surface of the stone from the bosom to the skirt.

An improved dish cleaner and drainer has been patented by Mr. Samuel B. Luckett, of Knightstown, Ind. The invention consists in constructing a dish washing and drying apparatus, with a base frame, posts, and a top frame having dish receiving notches, a pan to receive the drip water, longitudinal bars for supporting cups while drying, a hinged angular plate or apron for supporting dishes while being washed, and a perforated pan for supporting knives and forks while drying.

Mr. Bat Smith, of Spanish Camp, Texas, has patented a composition for preserving wood, consisting of coal-tar, crude carbolic acid, and crude pyroligneous acid.

Mr. John H. Gramps, of Stone Arabia, N. Y., has invented a holder for use with ordinary hand lamps, by which such lamps can be securely held on sewing machines, tables, etc., and at other places where there is liability of the lamps being upset. The invention consists in a combined clamp and adjustable holder adapted for being secured to the edge of a table, and for holding the lamp in any position required.

Mr. Gamaliel King, of Westfield, Mass , has patented an improved whip formed of a central cord and sectional rattan cover

An improved rein holder has been patented by Mr. Edward C. Clarke, of Circleville, Ohio. This is a device to be attached to the dashboard, seat, or other part of a carriage or other conveyance for holding the reins.

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Business and Personal.

The Charge for Insertion under this head is One Dollar a line for each insertion; about eight words to a line. Advertisements must be received at publication office as early as Thursday morning to appear in next issue.

Centrifugal Pumps, 100 to 35,000 gals. per min. See p. 189.

Wanted—Bids for Lighting the Streets of Hazleton, Pa., either with oil, gas, or electricity. For particulars, address J. E. Giles, Chairman Council Committee.

Cook's Infusorial Earth. A superior quality. Apply to D. Judson Cook, Drakeville, Morris Co., N. J.

The American Electric Co. and Proprietors and Manufacturers of the Thomson Houston System of Electric Lighting of the Arc Style. New Britain, Conn.

Hoe and Shovel Factories send address to M. W. Chadbourne, Sheridan, Ark.

Electric Lights.—Thomson Houston System of the Arc type. Estimates given and contracts made. 631 Arch, Philadelphia.

Draughtsman's Sensitive Paper. Thos. H. McCollin, Philadelphia, Pa.

"How to Keep Boilers Clean," and other valuable information for steam users and engineers. Book of sixty-four pages, published by Jas. F. Hotchkiss, 84 John St., New York, mailed free to any address.

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Alden Crushers. Westinghouse Mach. Co., Pittsb'g, Pa.

Abbe Bolt Forging Machines and Palmer Power Hammer a specialty. S. C. Forsaith & Co., Manchester, N. H.

Supplement Catalogue.—Persons in pursuit of information on any special engineering, mechanical, or scientific subject, can have catalogue of contents of the SCIENTIFIC AMERICAN SUPPLEMENT sent to them free. The SUPPLEMENT contains lengthy articles embracing the whole range of engineering, mechanics, and physical science. Address Munn & Co., Publishers, New York.

Combination Roll and Rubber Co., 27 Barclay St., N. Y. Wringer Rolls and Moulded Goods Specialties.

Punching Presses & Shears for Metal-workers, Power Drill Presses, $25 upward. Power & Foot Lathes. Low Prices. Peerless Punch & Shear Co., 115 S. Liberty St., N. Y.

Improved Skinner Portable Engines. Erie, Pa.

The Eureka Mower cuts a six foot swath easier than a side cut mower cuts four feet, and leaves the cut grass standing light and loose, curing in half the time. Send for circular. Eureka Mower Company, Towanda, Pa.

For Machinists' Tools, see Whitcomb's adv., p. 173.

Pure Oak Leather Belting. C. W. Arny & Son, Manufacturers, Philadelphia. Correspondence solicited.

Presses & Dies. Ferracute Mach. Co., Bridgeton, N. J.

Split Pulleys at low prices, and of same strength and appearance as Whole Pulleys. Yocom & Son's Shafting Works, Drinker St., Philadelphia, Pa.

Wood-Working Machinery of Improved Design and Workmanship. Cordesman, Egan & Co., Cincinnati, O.

Experts in Patent Causes and Mechanical Counsel. Park Benjamin & Bro., 50 Astor House, New York.

Malleable and Gray Iron Castings, all descriptions, by Erie Malleable Iron Company, limited, Erie, Pa.

National Steel Tube Cleaner for boiler tubes. Adjustable, durable. Chalmers-Spence Co., 10 Cortlandt St., N. Y.

Corrugated Wrought Iron for Tires on Traction Engines, etc. Sole mfrs., H. Lloyd, Son & Co., Pittsb'g, Pa.

Best Oak Tanned Leather Belting. Wm. F. Forepaugh, Jr., & Bros., 531 Jefferson St., Philadelphia, Pa.

Nickel Plating.—Sole manufacturers cast nickel anodes, pure nickel salts, importers Vienna lime, crocus, etc. Hanson & Van Winkle, Newark, N. J., and 92 and 94 Liberty St., New York.

Presses, Dies, Tools for working Sheet Metals, etc. Fruit and other Can Tools. E. W. Bliss, Brooklyn, N. Y.

For Pat. Safety Elevators, Hoisting Engines, Friction Clutch Pulleys, Cut-off Coupling, see Frisbie's ad. p. 158.

Safety Boilers. See Harrison Boiler Works adv., p. 157.

Long & Allstatter Co.'s Power Punch. See adv., p. 158.

Mineral Lands Prospected, Artesian Wells Bored, by Pa. Diamond Drill Co. Box 423, Pottsville, Pa. See p. 156.

Rollstone Mac. Co.'s Wood Working Mach'y ad. p. 157.

The Sweetland Chuck. See illus. adv., p. 172.

Machine Knives for Wood-working Machinery, Book Binders, and Paper Mills. Also manufacturers of Soloman's Parallel Vise. Taylor, Stiles & Co., Riegelsville, N. J.

Skinner's Chuck. Universal, and Eccentric. See p. 173.

See Bentel, Margedant & Co.'s adv., page 189

Cope & Maxwell M'f'g Co.'s Pump adv., page 189.

Diamond Drills, J. Dickinson, 64 Nassau St., N. Y.

Steam Hammers, Improved Hydraulic Jacks, and Tube Expanders. R. Dudgeon, 24 Columbia St., New York.

50,000 Sawyers wanted. Your full address for Emerson's Hand Book of Saws (free). Over 100 illustrations and pages of valuable information. How to straighten saws, etc. Emerson, Smith & Co., Beaver Falls, Pa.

Rolled Nickel Anodes, Grain Nickel, Nickel Salts, Platers' Supplies. Greene, Tweed & Co., New York.

Telegraph, Telephone, Elec. Light Supplies. See p. 189.

Elevators, Freight and Passenger. Shafting, Pulleys and Hangers. L. S. Graves & Son, Rochester, N. Y.

Gear Wheels for Models (list free); Experimental Work, etc. D. Gilbert & Son, 212 Chester St., Phila., Pa.

Gould & Eberhardt's Machinists' Tools. See adv., p. 190.

Turkey Emery, Star Glue, Pumice, Walrus Leather. Polishers' Supplies. Greene, Tweed & Co., 118 Chambers St., N. Y.

4 to 40 H. P. Steam Engines. See adv. p. 189.

The Medart Pat. Wrought Rim Pulley. See adv., p. 189.

For Heavy Punches, etc., see illustrated advertisement of Hilles & Jones, on page 190.

Comb'd Punch & Shears; Universal Lathe Chucks. Lambertville Iron Work. Lambertsville, N. J. See ad. p. 157.

Upright Self-feeding Hand Drilling Machine. Excellent construction. Pratt & Whitney Co., Hartford, Conn.

Catechism of the Locomotive. 625 pages, 250 engravings. The most accurate, complete, and easily understood book on the Locomotive. Price $2.50. Send for a catalogue of railroad books. The Railroad Gazette, 73 Broadway, New York.

For best low price Planer and Matcher, and latest improved Sash, Door, and Blind Machinery, Send for catalogue to Rowley & Hermance, Williamsport, Pa.

The only economical and practical Gas Engine in the market is the new "Otto" Silent, built by Schleicher, Schumm & Co., Philadelphia, Pa. Send for circular.

The Porter-Allen High Speed Steam Engine. Southwork Foundry & Mach. Co., 430 Washington Av., Phil. Pa.

Ore Breaker, Crusher, and Pulverizer. Smaller sizes run by horse power. See p. 189. Totten & Co., Pittsburg.

Notes & Queries

HINTS TO CORRESPONDENTS.

No attention will be paid to communications unless accompanied with the full name and address of the writer.

Names and addresses of correspondents will not be given to inquirers.

We renew our request that correspondents, in referring to former answers or articles, will be kind enough to name the date of the paper and the page, or the number of the question.

Correspondents whose inquiries do not appear after a reasonable time should repeat them. If not then published, they may conclude that, for good reasons, the Editor declines them.

Persons desiring special information which is purely of a personal character, and not of general interest, should remit from $1 to $5, according to the subject, as we cannot be expected to spend time and labor to obtain such information without remuneration.

Any numbers of the SCIENTIFIC AMERICAN SUPPLEMENT referred to in these columns may be had at this office. Price 10 cents each.

(1) T. H. S. writes: I have put up some rolled shafting, and some of it runs untrue. Can you inform me of any easy method of straightening it without taking it down? A. Only by using a portable press, such as used for bending or straightening railroad iron, or by drawing it with a hammer on the hollow side. The former mode is the best.

(2) S. E. R. asks: What capacity or what difference would there be in two boilers, one being 56 inches diameter, 18 feet long, the other 56 inches diameter, 12 feet long. How much larger is the 18 foot than the 12 foot—is it a half or a third? A. The 18 foot boiler, if properly proportioned, would be about 25 per cent more than the 12 foot, and should be more economical. It should have larger tubes than for 12 feet length.

(3) S. W. B. asks: What ought to be the size and length of flue, and the size, height, and distance from engine, of chimney, to secure proper draught for an engine rated at 20 horse power and supplied by two boilers, the furnaces of which are 5 feet 7 inches wide and 22½ inches high? A. 26 or 28 inches square and about 50 feet in height. 2. Will a difference of an inch or two in the level of the two boilers affect their working materially? A. No.

(4) G. G. asks: 1. What is the average weight of an English locomotive? A. 30 to 35 tons. 2. Which is the better adapted to attain the maximum amount of speed, the American or the English locomotive? A. American.

(5) J. W. S. asks: 1. What is the best regular time made on any railroad in the United States? A. From Jersey city to Philadelphia, 98 miles, in 1 hour 50 minutes. 2. What is the weight of the heaviest locomotive in the United States? A. About 40 tons.

(6) W. W. S. H. asks: 1. What is the rule for finding the horse power of a steam engine? A. You are referred to rule in SUPPLEMENT, No. 253. 2. Also the rule for ascertaining the pressure of steam in a boiler where there is no steam gauge? A. By measuring the safety valve and calculating the pressure from it.

(7) E. S. H. asks is glass as great a non-conductor of heat as any substance known. A. Glass is, relatively speaking, a good conductor of heat. Dry wool, feathers, dry saw dust, charcoal, confined air, etc., are much better non-conductors.

(8) A. G. O. asks (1) whether there is any perfectly pure and free-from-lead zinc (No. 20) made in this country, and where it is manufactured. A. Zinc manufactured by the New Jersey Zinc Company, near Franklin, is pure or nearly so. 2. What is the best process to detect lead in zinc? A. Dissolve a fragment of the metal in hot dilute hydrochloric acid, and pass hydrogen sulphide (gas) into the liquid until the latter smells strongly of the gas. If lead is present a black precipitate will be observed.

(9) P. G. R. writes: Can you give me a recipe for a good durable brown wash for fences? A. Try the following: White lime, ½ bushel; hydraulic cement, 3 pecks; umber and ocher, each 10 lb; Venetian red, 1 lb.; lampblack, ¼ lb. Slake the lime, shake up the lampblack with a little vinegar, mix well together, add the cement, and fill the barrel with water. Let it stand several hours, and stir frequently while putting on. A larger proportion of ocher will give it a darker shade. The wash covers well. Only one coat is needed. It is said that the coating will look well after five years' exposure to the weather without removing.

(10) E. S. N. writes: Within a month or so I heard in this vicinity of the action of certain boilers which might give some light on explosions similar to the one at Pottsville lately. An excellent boilermaker was telling about his going into a mill for which he furnished the boilers, and on looking under the boilers found them all red hot for eight or ten feet back from the front. He called the manager and told him his boilers were empty. "Oh, no," he said, "they are that way quite frequently; it's all right." The boilers are 5 inch shell, four inch tubes, 16 feet long, fired with sawdust for all the steam they can make. We then both called to mind an experiment made by an engineer in a flouring mill here. He carried a pipe through the front head of boiler, within an inch of the bottom, running in three or four feet, and provided with a valve outside of boiler; quite frequently when firing hard, clear, dry steam would issue from said valve when opened, showing that no water was in contact with bottom of boiler. This was a tubular 7-foot or 8-foot shell. This may not be anything new to many, but was to me. A. It is not uncommon for badly proportioned boilers, with bad circulation and under hard firing, for the water to lift temporarily from the metal; but it is dangerous, and, in the case you mention, may occur once too many times.

(11) W. B. H. writes: A note in your paper of the last issue by W. L., No. 12, on page 183, referring to the cement or whitewash used on the White House at Washington, has induced me to ask you to answer two or three questions through your valuable paper. They are as follows: 1. Would the application of one, two, or more coats of that cement stop the leaking of a tin roof so put on as to leak badly? A. The coating will hardly answer the purpose. 2. Will you give a statement of the materials of which it is composed, and the proportion of each, and how made, whether by heating, boiling, or cold; and how applied, whether hot or cold. A. See "A Durable Whitewash," page 52, current volume. 3. If that will not answer, can you tell me what will stop the leaks without a new roof? A. Give the roof one or more good coats, when dry, of good roofing paint—red ocher ground in oil.

(12) F. C. H. asks: Can an "American" locomotive, consuming from 50 to 60 lb. coal per hour, require from 350 to 500 lb. of water per mile, as stated in last issue—twenty-five times as much as a stationary engine? A. It depends upon the efficiency of the boiler. Boilers evaporate 6 to 9 lb. water per pound of coal, and if the train is so heavy as to require 50 lb. coal, per mile—then 50×8=400 lb. water. Light trains of course require less coal and water—some not more than one half the above.

(13) J. A. W. writes: 1. I blow my boiler out clean once a week. Is it best to let it dry over night and put cold water in the next day, or put water, at 100°, in from tank immediately after blowing off? A. Let the boiler cool. 2. Is there any method of preventing a safety valve from sticking other than frequent trials? A. A safety valve should be examined and cleaned frequently. Some forms are more apt to stick than others.

(14) G. H. H. asks: 1. At what part of the stroke does the steam cut off in a link motion locomotive engine, when she is said to work on full stroke? A. Usually about seven-eighths the stroke. 2. Does it take the same quantity of fuel to convert a given quantity of water into steam in a boiler under a high pressure, say, at 100 lb. to square inch, as it does at the atmospheric pressure? A. Approximately, but not exactly.

(15) E. N. M. writes: I notice that there have been a great many rotary steam engines invented, but at the same time there are but very few used. What are some of the most important objections to the use of that class of engine? A. The principal objection is, that they cannot be kept tight. Another is that the working steam expansively cannot be readily secured, and they are not economical.

(16) J. M. C. asks: Can you give me a formula for a cement to be placed under the patch, covering a rent in a large boiler? It must be watertight and not affected by heat. A. A mixture of white and red lead, with very fine iron borings, the whole made into a stiff putty with linseed oil.

(17) G. G. asks: Is there any way to remove iron rust from cloth? A. If the cloth is uncolored moisten the stained parts with hydrochloric acid diluted with about three volumes of water and warmed. Thoroughly rinse the cloth in plenty of cold water afterwards. It is nearly impossible to remove such stains from some colored fabrics.

(18) J. S. asks for an effectual remedy for the extermination of red ants. They abound in dry sandy localities, and during the summer months become a terror to housekeepers. I have tried all remedies that I know of, but all fail in accomplishing permanent results. A. The judicious use of a small quantity of oil of turpentine will often drive away the pests. It may be injected into cracks and crevices in closets and elsewhere from an ordinary sewing machine oil can.

(19) S. C. asks: Can you tell me what to do to kill the borers in pine flooring? The floor is fifty years old and perfectly sound until about two years ago, when the borers got in from pine wood stored under the house. A. Try turpentine as directed in answer to J. S., this page.

(20) J. H. W. writes: I tried to marble on paper per instructions in SCIENTIFIC AMERICAN SUPPLEMENT, but the colors sank to the bottom. What is the cause? I used Venetian red and lampblack. I burnt the lampblack to free it from grease. I cannot see where my error is. A. The colors must be ground very fine with the vehicle and floated on to the water carefully—not mixed with it. The marbling must be done immediately after the floating is accomplished. 2. Will a helix or electro-magnet increase the force of the current from a battery? A. As we understand your question, no. 3. In using a battery for medical purposes, is an electro-magnet of any benefit? Is a helix of any benefit? Which is better? A. Your question is rather indefinite. An intermittent current of sufficient tension for medical use can be obtained from either a magneto electric machine or induction apparatus when properly constructed, the electricity from both sources possessing similar qualities. The induction apparatus is more easily managed, and is for that reason usually preferred.

(21) J. G. W. asks as to the composition of rollers for a printing press. A. Best white glue and concentrated glycerine, equal parts. Soften the glue by soaking it over night in enough cold water to just cover it. Strain off excess of water, heat the glycerine over a salt water bath, add the glue, and stir until the glue is all dissolved. Continue the heat for several hours to expel as much of the water as possible. Let the composition get cold, and remelt it several times before at last pouring into the well oiled brass cylinder mould. Give the composition plenty of time to cool and harden before removing it from the mould.

(22) C. S. M. asks if young trees about six inches in diameter can be moved. If so, what is the right time to do it and the best way? A. Easily. Move in winter, when the earth is frozen about the roots. Move as large a block of earth with the roots as can be handled.

(23) W. T. B. asks for a receipt for taking copying ink stains out of linen shirt bosoms and white duck vests, etc. A. Make a strong solution of good bleaching powder (chlorinated lime) in cold water and apply to the stains; then apply a strong aqueous solution of oxalic acid (cold). Repeat if necessary until the stains disappear, then rinse thoroughly in cold water.

(24) W. L. asks: 1. In the preservation of eggs, mentioned in the SCIENTIFIC AMERICAN, No. 1, July, 1881, will the eggs keep as long in the lime pickle as they would if packed in powdered charcoal after being dipped in paraffine? A. The charcoal is the best. 2. How should the pickle be made? A. Add lime and salt in about the proportion of half a pound each for every bucket of water. 3. Would there be any risk in keeping eggs by this process for a year or more? A. If the eggs are well covered with paraffine as directed there will be little danger provided they are stored in a cool place where the temperature does not change much. 4. Would they keep as well in a room well ventilated as they would if put in a cellar? A. The cellar is best. 5. Where can an incubator be bought? A. See column of Business and Personal and Hints to Correspondents. 6. How can an artificial mother for chickens be made? A. See Incubator and Incubation, in SUPPLEMENTS Nos. 26 and 64.

(25) C. P. asks how to make the yeast, and the quantity to put to each gallon of hop beer. A. See Summer Beverages, in SUPPLEMENT, No. 192.

(26) C. T. F. asks: Can you inform me how I can get a light of glass that will stand the heat? I want to put the glass in an iron box in which I am to place articles which I am going to subject to about 300°. A. Good lime soda glass will stand a temperature of 300° Fah. very well without softening. It will not break under the conditions if the precaution is taken to heat it gradually and uniformly at first.

(27) H. A. F. writes: I have at my fisheries a large lot of fish offal and fish not merchantable which I would like to convert into guano or fertilizer in some cheap way. A. Pass the refuse through a mincing machine and expose it in layers about three inches deep in a kiln heated to about 300° Fah., until properly dried. It is sometimes mixed with three times its weight of dry earth and sprinkled with dilute oil of vitriol before drying.

(28) J. T. asks for the best polish for flax or hemp twines, that is, what composition mixed in starch will give a twine a glossy appearance? A. Try the following: To 1 lb. starch add (at blood heat) blood albumen, 2 oz.; water-glass (sirupy), 3 oz.; curd soap, ¼ oz., (dissolved in warm water). Beat together and let it stand forty-eight hours or more before applying.

(29) C. G. says, in answer to W. W. C., page 26 (24), current volume: "If he will lick over the writing with a moist tongue, the writing, after the paper has become dry, cannot be effaced even with India-rubber. The process is not very nice but is very effectual."

(30) G. R. S. writes: In your issue of August 20, 1881, you describe an improved hectograph. Will you oblige me by explaining how the negative (after once using the pad) can be erased, so as to allow the gelatine to be used a second time? A. Remelt the pad, skim off any floating matters, and let it cool again before using.

(31) C. G. asks: 1. Is there any book published on working and tempering steel, as practiced in the die maker's trade? A. There is no single work especially devoted to this subject. The information is scattered through various cyclopedias and works on mechanics. There is great need of a really practical work on working and tempering steel. We can suggest no better way for you to get the information you desire than to obtain it from practical men who have had long experience in the business. 2. If there is, where can it be obtained, and the price? A. Such books as are published can be obtained from booksellers who advertise in our columns. 3. What is the best protection for a steel worker to wear over his eyes? Where can it be bought? A. Probably a pair of good goggles with rather thick glasses would answer your purpose. These may be purchased from any optician in this city.

(32) W. H. L. asks: 1. Will you please tell me if there is any way to remove the stain made by bichromate of potassa, after it has been exposed to sunlight? A. If the substance will bear it use a solution of 1 oz. caustic potassa dissolved in 3 oz. of water, and after rinsing, a small quantity of strong warm acetic acid. 2. Is there any good method of removing freckles? If so, please give it. A. We know of no very satisfactory remedy other than bathing the skin frequently with fresh cream and protecting it from strong sunlight and wind. 3. What is the accepted theory in regard to a vacuum above our atmosphere? Is it considered a perfect vacuum? A. Probably not. 4. I have heard or read that a perfect vacuum is an insulator to heat. If so, how do we get the sun's heat? A. Heat and light pass unimpeded through vacua, that is, space practically devoid of air, aqueous vapor, or other ponderable substance. 5. Will electricity pass through a perfect vacuum? I know it will pass through the vacuum made by air pumps. A. No.

(33) D. C. B. asks: 1. Would you please inform me through SCIENTIFIC AMERICAN what ingredients and proportion of same compose hectograph described August 20, page 116 of SCIENTIFIC AMERICAN? A. Soften 1 oz. of fine gelatine by soaking it over night in a small quantity of soft cold water. Press out excess of water in a cloth, and dissolve the gelatine in about 8 oz. of concentrated glycerine by heating over a hot water bath for an hour or so. See article on copying pads,

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page 100, vol. xlii. 2. What make of printer's ink is used in process? A. Best letterpress ink. 3. Can ink be rubbed from pad as in the ordinary copygraph? A. No.

(34) J. A. S. asks: Is there any known chemical which will render rope or cloth incombustible or partly so? A. Saturate the fibers with a solution of 1 lb. crude tungstate of soda in a gallon of hot water.

(35) F. A. asks how to draw water from a distance of about 15 feet in length, and about 40 feet deep. You understand the well is about 15 feet from the place where I want to place the pump, and the well is about 40 feet deep. A. Your pump should be not more than 24 to 28 feet above the surface of the water in the well, therefore you must place the pump in the well and arrange a mode of working it at the point of delivery. Or sink the pump in the earth to the requisite depth, and lead pipe from it to the well.

MINERALS, ETC.—Specimens have been received from the following correspondents, and examined, with the results stated:

E. C. C.—Schistose rock containing a little iron oxide—probably manganiferous.—G. F. B.—Iron pyrites—iron sulphide—no value.

[OFFICIAL.]

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FOR WHICH

Letters Patent of the United States were Granted in the Week Ending

August 23, 1881,

AND EACH BEARING THAT DATE.

[Those marked (r) are reissued patents.]

A printed copy of the specification and drawing of any patent in the annexed list, also of any patent issued since 1866, will be furnished from this office for 25 cents. In ordering please state the number and date of the patent desired and remit to Munn & Co., 37 Park Row, New York city. We also furnish copies of patents granted prior to 1866; but at increased cost, as the specifications not being printed, must be copied by hand.

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Wave power apparatus, I. L. Roberts, Jacksonville, Fla.

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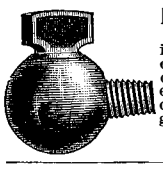

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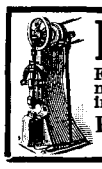

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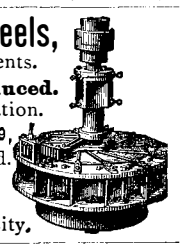

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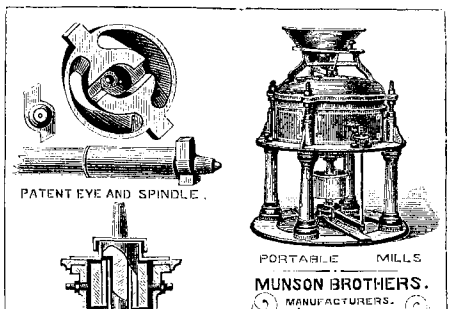
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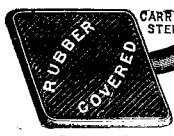

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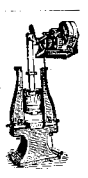
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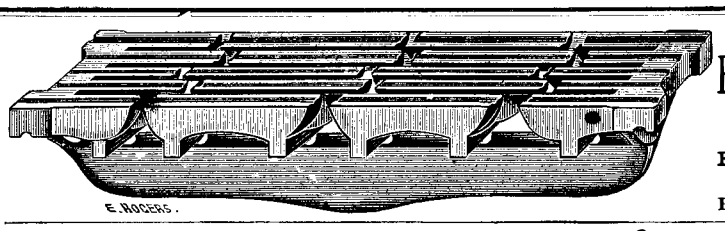

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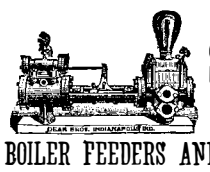

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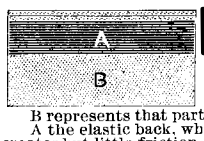

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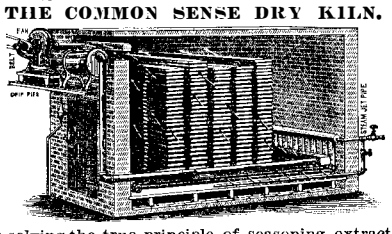

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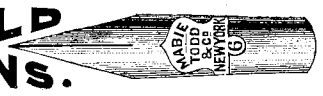

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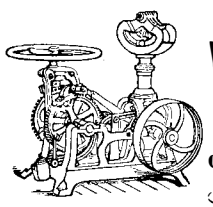

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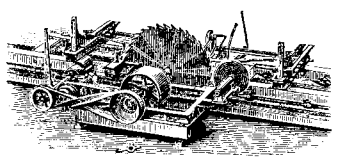

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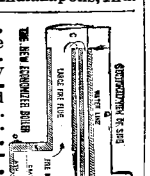

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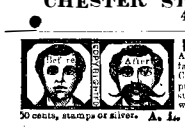

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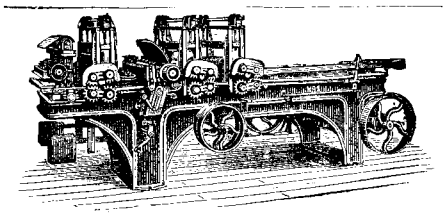

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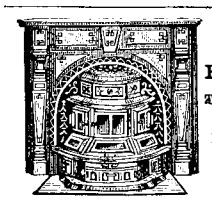

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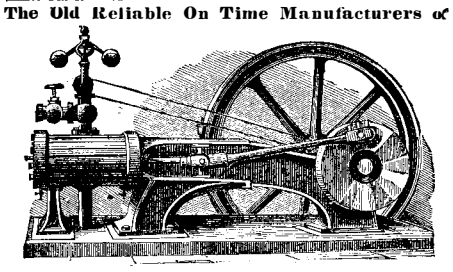

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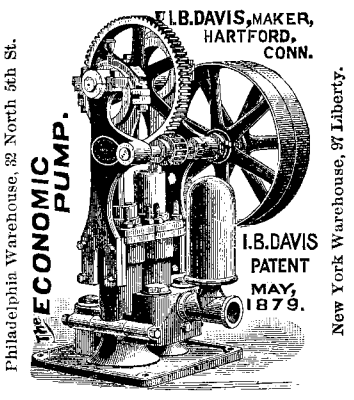
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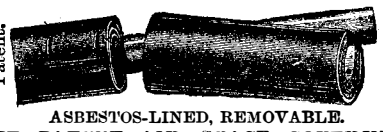
Toope's Patent.  August, 1875.

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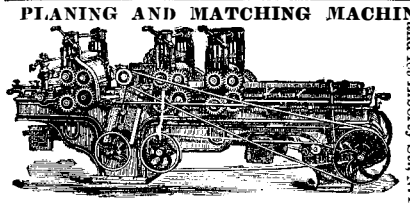

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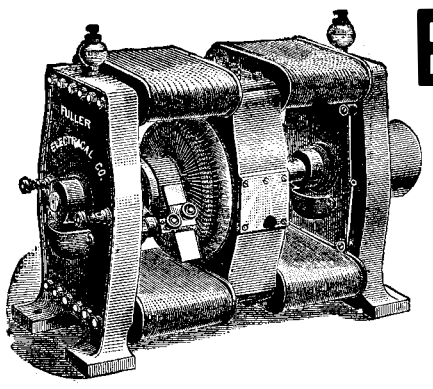

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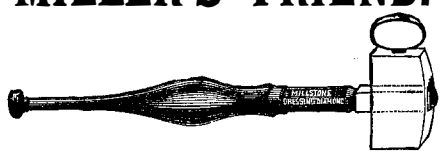

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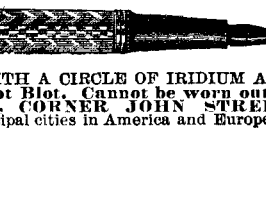

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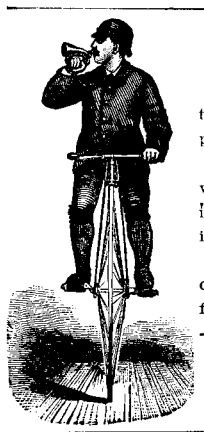

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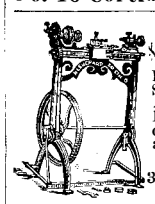

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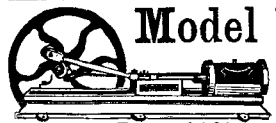

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